



FRIDAY, MARCH 5.

**Contributions.****An American Bridge for New South Wales.**

LONDON, Feb. 9, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Jan. 29 you state that the contract for the Hawkesbury Bridge, New South Wales, has been taken by the Union Bridge Co. of New York, which could successfully compete with European builders because the American builders can construct a bridge at a lower cost per pound. This was not the reason that decided the contract; the foundation, not the superstructure, settled the matter. My firm tendered for a bridge with 262 ft. span, against 416 ft. spans proposed by the Union Bridge Company. We thus increased the number of piers, and consequently the total cost of the bridge, because larger spans would throw excessive loads on the piers, considering the nature of the river bed. Deducting the normal pressure caused by 114 ft. of mud and 52 ft. of water, we proposed to put an extra load of 12,700 lbs. per square foot on the foundations, the cylindrical piers being filled up solid with concrete. We proposed to excavate the bed of the river by a method used by Mr. Bradford Leslie on the Gorai Bridge, in India, a boring head or auger cutting a hole some 9 ft. diameter, and forcing the mud up the hollow stem of the auger. As the foundations go down 170 ft. below high water into uncertain ground, we allowed a large sum for contingencies, a precaution the neglect of which the Union Bridge Co. will possibly regret. Our tender was \$500,000 in excess of theirs, but some \$200,000 extra work will have to be done by them as a condition of obtaining the order.

AN ENGLISH BRIDGE BUILDER.

**Mr. McKenna's Train Dispatcher's Board.**

TO THE EDITOR OF THE RAILROAD GAZETTE:

"The Telegraph as Applied to Train Movement," in the *Railroad Gazette* of Feb. 19, interested me greatly, as it showed a practical application of a principle which I advocated several years ago as an aid to train dispatchers. The "train dispatcher's board," as shown in the illustration, is a compact and simple arrangement, and shows in the clearest manner the position of the several trains. A single glance at the board is sufficient to keep the matter clear in the mind of the dispatcher. I judge from the illustration that the board is reversible, one side for "a. m." trains and the other for "p. m." trains, and that the time-table is printed upon a slip that is detachable, a new slip to be inserted whenever the time-table is changed.

One point in the description does not exactly tally with the cut. It says "the board is divided by a line in the centre, the left hand half being devoted to trains going south." The cut shows odd numbered and even numbered trains placed along in order by their time of departure, which seems to me much better than to use separate halves of the board for trains moving in opposite directions. When the trains are near together the pins should be together also, so as to indicate at once the dangerous proximity of the trains. Mr. McKenna's paper shows that this board became a useful if not indispensable adjunct of the train dispatchers' office. It is evident that the apparatus will admit of variation in size and shape, so as to adapt it to any length of road or any number of trains. I would like to inquire if the pegs are numbered to correspond with the train numbers and also where the extra trains are "pegged," whether at the right hand end, under the heading "extra trains," or in some line under the hour at which they are occupying the track, and also when trains run in two or more sections, where are the pegs for the second and third sections placed?

The form of diagram is doubtless an improvement upon the one I proposed, which was published in the *Railroad Gazette* in July, 1883, I believe.

As Mr. McKenna's system has been in use since January, 1882, it is older than my idea, although unknown to me at the time my article was written—another demonstration of the old saw "there is nothing new under the sun."

It is a satisfaction to know that the principle of "a diagram for train dispatchers" had been in successful use for several years, notwithstanding the denunciation my suggestion received at the time it appeared in the *Gazette*.

EAST SAGINAW, Mich., Feb. 26, 1886. T. APPLETON.

**The Authority of Division Superintendents.**

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your paper of Jan. 29 I noticed an article written by one who signed himself "Superintendent," expressing great surprise because a roadmaster criticised and showed up a few of the many weak points and impractical ideas contained in several communications contributed by him to your paper entitled "The Operating Department and Management of Railways."

I hope the gentleman will pardon me if I venture to make a few remarks upon the different subjects treated by him.

In the first place he claims that the maintenance of way should not be under the control of the Chief Engineer; that the Division Superintendent, who has been promoted from the position of Telegraph Operator, Clerk, Conductor, etc., is more competent to have charge of the department. Let us stop and look on while such a Superintendent is directing the

construction of a road, including the grading, laying track, ballasting, arranging the proper elevation of curves, and the placing of frogs and switches, which he assumes his brother Superintendent understands all about, even if he never had any practical experience in the different branches, and would have us believe that the Chief Engineer who has mastered such subjects is dealing with something that he knows very little about. Fortunately for the owners of the railroads in this country, there are too many practical men among them to believe such theories.

"Superintendent" says that things should be called by their right names, and in this I fully agree with him; but in order to do so the right men must be put in the right place. He wants full control of everything upon his division, including maintenance of way, bridges and buildings, and machine shops, with a Roadmaster and Master Mechanic (or a "Mechanical Engineer," which name he would substitute for the latter title, for some reason) as his assistants. He also wants the title of Roadmaster changed to that of "Supervisor," and does not give any reasons for the same, and so I take it that he is afraid that the former titles might have a tendency to lessen the authority of the Superintendent in the eyes of his subordinates and the public generally. I do not think the Roadmaster or Master Mechanic cares very much what his title is; but as "Superintendent" suggested, I think they should be called by their right names, and if a man is in charge of machinery and mechanics his title should be Master Mechanic instead of "Mechanical Engineer," and the same thing will apply to the Roadmaster. If the latter has mastered the different branches pertaining to his line of business, from that of the laborer driving his first spike to his present position, he has certainly earned the title, and it is more appropriate for his rank than that of "Supervisor."

And now let me ask "Superintendent" if he is a "mechanical engineer?" Has he ever worked upon the track? Can he take a gang of men and put in a switch properly, surface or line track, or direct other branches pertaining to maintenance of way? And if he is not a mechanical engineer nor a practical workman upon maintenance of way, why should he be made the head of these departments? No man should be put at the head of any department unless he knows more about the work, or at least as much, as the men that are working under him, otherwise on account of his ignorance he will be apt to have incompetent assistants; and on account of there being so few superintendents who have been educated in all the departments, it is far better to have separate departments with an expert at the head of each, and let these report to the President or General Manager.

Therefore I say again, "call things by their right names," and put the right men in the right places.

ANOTHER ROADMASTER.

**Freight-Car Buffers.**

CHICAGO, Feb. 26, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I would like to submit to the consideration of the Master Car-Builders the inquiry, How much motion is desirable in a draw-bar which also acts as a buffer? According to my notion the least motion consistent with the elastic cushioning of the blows which the buffer must receive is what is most desirable.

Perhaps it is not a spring but some frictional device which should be employed to absorb the effects of the blows, like the hydraulic buffer which receives the recoil of a great canon.

Before a selection is made from the many forms of draw-bars now being tested under the care of the Master Car-Builders' Association, it should first be decided whether all or nearly all do not allow a great deal more motion than is consistent with good practice, or than can be tolerated with the great masses to which our loaded cars have attained. So far as the draw-bar and buffer are concerned, they are very slightly modified, except as to the coupling devices, from the very insufficient arrangements which were adopted for the early cars, weighing with load from 6 to 12 tons, when 12 or 15 such cars made a full train for an engine.

It is one of the most important matters before the Master Car-Builders' Association to decide upon the direction which the necessary changes for improvements in the draft-rigging shall take, and I, for one, hope that they will listen to Hamlet's advice and "reform it altogether."

Let us have, gentlemen, if you please, an attachment which shall give us the least possible change in the length of the train and in the distance between the cars.

ARCHIMEDES STEPHENSON WATT.

**Radius of Curves Between Switch Point and Point of Frog.**

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am very much surprised at the inquiry of "Inquirer" in the last number of the *Railroad Gazette* regarding the radii of the curves between the switch points and frogs of the Pennsylvania switches. He certainly cannot be familiar with the simple formula, "2 gauge  $\times$  No. of frog," which gives the frog distance, i. e., the distance between the switch joint and the frog measured along the rail of the main track. In the case of the No. 10 frog which he cites, we have per the above formula 95 ft., as given in the plans.

Now, as to the radius we have simply to multiply the frog distance by the No. of the frog to get the radius of the curve, which in this case would be 950 ft.

Regarding a piece of tangent next to the frog as he suggests, in my humble opinion I regard this as an unnecessary refinement and of little effect and value in actual practice.

W. O. LELIME.

**Substitutes for Engineers' Chains.**

ROCKLAND, Me., March 1, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Seeing the inquiry about chains (and substitutes) in your last issue, I wish to say that I have made considerable use of a 100-ft. "Grunman" chain, 200 links No. 15 steel wire, weighing complete a small fraction over two pounds. I have the rear handle made of a special pattern to prevent catching in brush. Being light, it is easily straightened, and gives—for a chain—a very accurate measurement when carefully used. True, links will break; but spare links are sent out by the maker with each chain, and a broken one can be replaced with very little delay, and for preliminary work in the woods I think nothing more satisfactory can be found. For location in any country not extraordinarily rough, I prefer a steel tape, about  $\frac{1}{4}$  in. wide, and for construction I very much prefer the tape. If your correspondent thinks it worth while to send me his address, I will write him the address of the maker of the best tapes I have seen, and also some other minor details in regard to chain, which it is not worth while to take up your space (or time) with. O. H. TRIPP.

TOLEDO, O., March 1, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the issue of the *Gazette* of Feb. 26 I notice an inquiry by C. Hain for a substitute for the 100-ft. steel chain. Following his inquiry you say editorially: "For ordinary railroad work no good substitute for the chain seems probable." I have always been of this opinion until I tried a substitute, and am now convinced that a "good substitute" has already been found in the "chain bands" manufactured by Mr. L. Beekman of this city, or F. J. Sager, of Marysville, O. They are simply three ribbon bands with detachable handles, and are graduated either with brass sleeves or drops of babbitt metal, in any manner desired. I find them an excellent substitute for the chain, and would not be without them.

E. BUXTON,  
Chief Engineer Toledo & Ohio Central Railway.**Rail Specifications.**

PHILADELPHIA, Feb. 27, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

When a discussion has languished to such a state of inervation that nobody can prove anything on its premises, an appeal to horse sense is sometimes effectual.

I refer to the steel rail discussion.

Engineers write specifications for steel for bridges or for boilers with freedom and confidence; but not one in one hundred is willing to attempt a steel rail specification, and those who do attempt it handle it very gingerly. Meanwhile the failure of a bridge or a boiler is a ten-fold greater calamity than the failure of steel rails. The fact is, we don't believe what the doctors tell us about the physical properties of steel rails, while we unfortunately do believe it necessary to plunge into chemistry in their behalf.

In the face of such weakness we learn that a railroad manager has become disgusted, and actually proposes to pay \$10 more per ton for English rails. The humiliation is keen; none the less so that Mr. Sandberg tells us we might get good rails here by "choosing a good maker," a "good specification" and "honest inspection." Clearly we must specify what we want in rails.

Two propositions commend themselves on practical grounds. First, a steel which is suitable for structural purposes is not one whit too hard for rails. Second, steel is essentially an alloy of iron and carbon. The nearer we keep it to that the better we shall understand it, and the less trouble we shall have from chemical metaphysics.

A specification for rail steel to have a breaking strain of 80,000 lbs., with good bending and stretching qualities, is a reasonable one; and why not put in a chemical clause like this:

"It is the sense of this specification that the manufacturer should grade his product by its carbon percentage, and tolerate other elements only in the quantities necessary for its proper manipulation. A heavy burden of impurities will be sufficient reason for rejecting a blow, regardless of physical tests." Then let the steel men use their judgment about carbon, while we rigidly rule them out when they propose to use "high manganese to neutralize high phosphorus," etc., etc. Yours truly,

FREDERICK H. LEWIS.

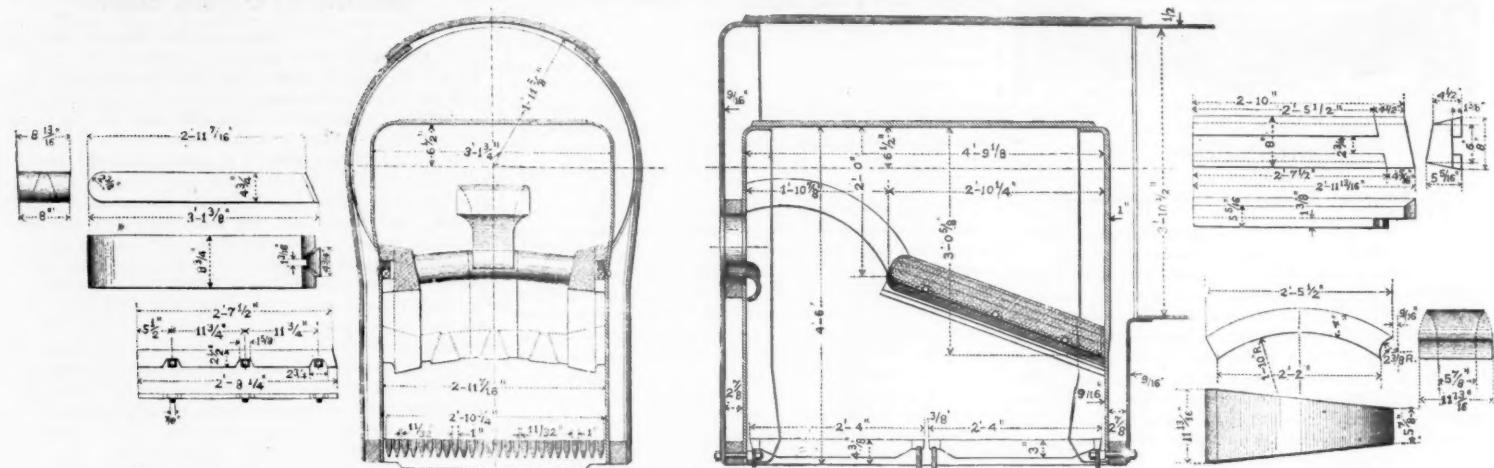
**Rail Joints and Nut-Locks.**

NEW YORK, Feb. 1, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

At present there seems to be more than ordinary interest taken in the rail-joint question. In respect to the old form of angle-bar, it is generally admitted that the consequences due to the uneven wear of the top of the bar under the rail-heads are of a serious nature, and it is pointed out, and an examination of bars some time in service shows, that excessive wear takes place along the top of the centre of the bar with less wear toward its ends. It is obvious if this wear takes place at the point where support is most needed, viz.: at the ends of the rails, that the bar will fail in the proper performance of its duty.

The tendency towards the use of bars with increased bearing surface along their top, as shown by the adoption of the form popularly known as the "Fritz & Sayre," is undoubtedly a step in the right direction; but before raising too high hopes of a marked improvement as a result of this change in form, it may not be amiss to consider whether the angle-bar in its old shape of narrow top edge has been fairly treated by many of our important railroads, and if with like treatment,



LOCOMOTIVE FIRE-BRICK ARCHES, DANISH STATE RAILROADS.

the "Fritz & Sayre" bar will meet the expectations of those who decide to use it.

The chief engineers of those railroads which use and advocate an elastic nut-lock at the joint would not say, if directly questioned, that they expected to take up the defective wear of the joint as well as lock the nut by its use; but if one goes to the roadmasters of such roads or to their force—to those who come into direct contact with the work—it is exceptional to find any one of them who does not maintain that the elastic washer takes up the wear, or as they express it, *takes up the jingle*. Now, even up to this day, and perhaps from necessity, matters of detail pertaining to the track, while coming under the supervision of the Chief Engineer, are nevertheless largely determined by the Roadmaster. He, in his turn, is affected in his judgment more or less by his subordinates. So that, while it would not readily be admitted by the Engineer-in-Chief, yet it is true that "Mike and Barney," the doughty men of the wrench, have had a marked influence in settling certain matters of detail. It is not necessary to elaborate the argument by prying into the reasons which have prejudiced "Mike and Barney" in favor of elastic nut-locks. They themselves "give it away," so to speak, when they say the nut-lock *stops the jingle*.

But with a costly experience before them, to teach them a lesson, it seems improbable that instead of using bolts and nuts which fit each other, officers in charge of track will continue to use, with their improved form of angle-bars, a mechanical device which, however well it may hold the nut from turning back, does not prevent deflection of the joint, does not take up the wear therefrom; but which, by quieting the noise, does conceal in its initial stages to a considerable degree the weakness of the joint. Let it be borne in mind, however, that "Mike and Barney" consider that the *jingle* is the greater evil.

F. H. H.

#### Firebrick Arches, Danish State Railroads.

The annexed illustration accompanies an interesting article in the German *Organ for Railroad Progress*, on the use of brick arches in locomotive fire-boxes. We extract the following particulars in regard to their application on the Danish State railroads. They are used on about 150 locomotives on this system, with a collective monthly mileage of about 188,000 miles.

The table below gives the average coal consumption per locomotive-mile in pounds (including coal used in firing up and standing), with an average train of 22.3 axles and very little change in speeds or times during the period covered by the table.

	1882-3.	1883-4.	1884-5.
December...	33.9	31.0	27.5
January . .	33.1	29.4	26.6
February . .	34.3	29.8	25.6
March.....	33.9	28.5	25.9
April.....	32.4	29.1	25.9
Average ...	33.53	29.57	26.30
	Newcastle West-Hartley coal.	Slamannan coking coal.	
	Ordinary fire-box	With brick arch in fire-box.	

The Slamannan coal is a cheaper Scotch coal decided upon after adopting the brick arches, because it was found that they gave a quieter fire which permitted the use of a coal containing a greater quantity of slack.

The proportions of these arches are such that about 60 per cent. of the horizontal area of the fire-box is occupied by the arch. This was found to be the most satisfactory proportion. A first attempt to carry the arch further up toward the door caused too great a concentration of heat on the door. The arch is made 4 in. to 4 1/2 in. thick, according to the less or greater length of the fire-box. The arch is formed of five pieces, of which the two outer ones, forming the skew-backs, are modeled to exactly fit the fire-box sides and rest upon rectangular wrought-iron bars, the lower sides of which are notched to rest upon the heads of screws in the sides of the fire-box. This bar is shown in detail in the lower left-hand corner of our illustration. The lower ends of the fire-brick, abutting against the tube-sheet, are so formed

with dovetail-like projections as to leave a narrow space through which fine ashes dropping short of the tubes can find their way down to the grate. It was also found that without these openings leaks in the tubes passed unnoticed owing to the evaporation of the water on the back of the fire-arch, while with them the water drops into the fire, and gives warning of its presence. One of the three middle bricks of the arch is shown in detail in the upper left-hand corner of our illustration.

These arches have done well with both inclined and horizontal grates. Smoke is reduced to a minimum, and complete combustion is further aided by the use of a narrow counter-arch turned from above the fire door over to the edge of the main arch, dividing the draught from the grate upwards to the right and left, and also preventing the direct rush of the air from the door into the tubes. The supplementary arch is formed of a single piece of fire-brick, the form of which is clearly shown in the lower right-hand corner of the illustration.

This supplementary arch also fulfills the purpose of the cast or wrought-iron deflector plate generally used in England to direct the current of air admitted at the door downward on to the fire. The supplementary brick arch is more durable than the wrought-iron deflector plate, but, of course, cannot be as readily removed. It is therefore more difficult to detect leakage in the fire-box or examine or repair the tubes and stays. The supplementary brick arch has been for this reason abandoned in England. The fire door is made double, the outer portion being a solid plate. The inner plate is pierced with holes, and the air admitted to "burn the smoke" is regulated by opening the door slightly, setting the latch in one of the outer notches of the latch opening plate. Where double sliding doors are used—and these are the most approved practice of Germany, being constructed so that a

witstanding this reduction, the engines steam better than before, and economize fuel, as shown by the table.

The complete fitting of an engine with one of these arches costs in Germany \$4.25 for material, and \$1.75 for labor, and they have lasted on an average for 18,000 miles.

In order to avoid injurious effects from the heat on the lower portion of the door-ring, a protection casting with an air space between it and the ring is put on over the latter, forming a false bottom to the fire-door frame, which can be replaced when used up by heat or the wear caused by the use of the fire irons.

The account states that no trouble has been experienced from these arches falling down bodily. Single pieces do, however, occasionally fall, but without any bad results.

#### Suckow's Patent Extension Jack.

The accompanying engraving represents a form of jack lately introduced by Messrs. Pedrick & Ayer, proprietors of the L. B. Flanders Machine Works, Philadelphia, who have made quite a specialty of portable locomotive repair tools.

This jack differs from other makes of screw jacks in that it has a ball and socket joint at base and at top of screw. The ball bearing at the base allows the body of jack to gyrate in any direction to an angle of about 30°. The ball at bottom is held by two screws, one fitting in a groove in the ball, the other clamping the body of same, making the jack stiff and solid in any desired position, or, at the will of the operator, it can be loosened and made a complete carrying jack. Another advantage of the ball bearings is that the jack, bearing, and load, can be in almost any position, allowing the screw to work free, without packing strips or wedges to give equal bearings. It is made with or without the projecting foot at bottom of screw. The screw is cast steel, with threads cut in lathe, the shape of thread is  $\frac{1}{4}$  V. This thread works in a bronze nut.

The principal dimensions of the jack are as follow:

Height of jack when down...	27 1/2 in.
Rise of screw . . . . .	9 1/2 in.
Diameter of screw . . . . .	3 in.
Weight of jack . . . . .	80 lbs.
Capacity . . . . .	50 tons.
Raise of foot . . . . .	9 1/2 in.
Base . . . . .	13 by 8 1/2 in.

The makers claim that this jack is specially adapted for wrecking purposes, and that the great care taken in its manufacture, both as regards workmanship and materials, enables it to stand rough usage and do good service wherever a jack is applicable.

#### Foreign Railroad Notes.

During a recent discussion of the estimates for the railroads of Alsace and Lorraine, which are owned and worked by the German Empire, it was brought out that the daily work of locomotive engineers varied from 4 or 5 hours on fast trains to 10 hours on freight trains with switching service for a long time. The engineers had every fourth or fifth, or at the least every seventh day, for rest. Switchmen have a day off every two weeks.

The Railroad Society of Berlin, at its meeting Jan. 12, discussed the Hudson River Tunnel at New York. The East River was spoken of at this meeting as an arm of the Hudson. At the same meeting an army officer exhibited the "sounder" so generally used in our telegraph offices and explained its construction. He thought it would be a good thing in Germany.

#### Uniform System of Tests for Cement.

From the very valuable report of the Committee of the American Society of Civil Engineers on the above subject we make the following extracts, by the assistance of which it is not difficult to avoid the grosser errors in the purchase of cement, which result in great losses annually to almost every large company.

With the aid which has now been obtained from the elaborate report of the committee and the paper by Mr. Eliot C. Clarke on the Boston Main Drainage Works (*Railroad Gazette*, Jan. 22, 1886), there is no great trouble in detecting the badness of any very bad cement at least, large quantities of which are on the market, and the expense is merely some \$100 for a testing machine of the best type, three of which were illustrated in the *Railroad Gazette* of June 19

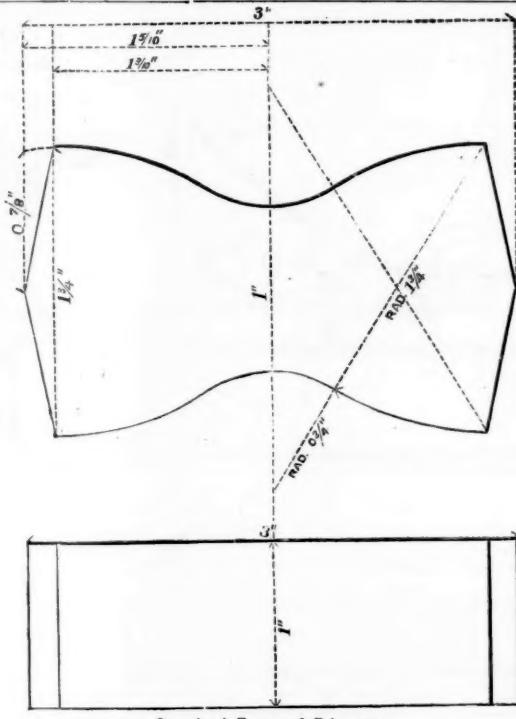
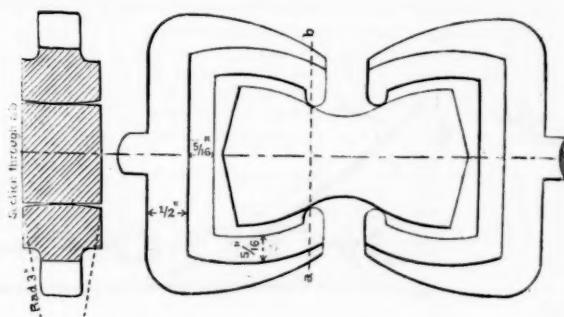
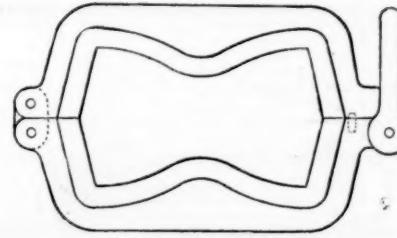


Suckow's Patent Extension Jack.

Made by the L. B. FLANDERS MACHINE WORKS,  
Philadelphia.

lever opens the two valves of the door in opposite directions—the air is simply admitted by leaving a crack open between the two halves of the door. An air opening in the fire-door of 5 to 6 per cent. of the grate area has been found the most profitable; and with this amount of air admission there is an almost entire absence of smoke, the exhaust from the stack becoming only light gray immediately after fresh firing.

Since the introduction of these arches the grate openings of the engines supplied with them have been contracted from  $\frac{1}{2}$  in. to  $\frac{1}{2}$  in. without diminishing the blast nozzles. Not

Standard Form of Briquette.  
(Full size.)Standard Arrangement of Clip for Briquettes.  
(Half size.)Standard Form for Mold.  
(Half size.)

1885, between which the committee say there is no great choice.

A uniform system of testing cement, in order to be practical, must be simple, rapid and easy of application, and should, of course, be reasonably accurate. Between the very careful tests of the laboratory, which consume much time and involve considerable expense, and the rough and unsatisfactory trials often resorted to from necessity, there is a middle ground, which it has been the endeavor of the Committee to occupy.

The first tests of inexperienced, though intelligent and careful persons, are usually very contradictory and inaccurate. Many things, apparently of minor importance, exert such a marked influence upon the results, that it is only by the greatest care in every particular, aided by experience and intelligence, that trustworthy tests can be made.

The test for tensile strength on a sectional area of one square inch is recommended, because, all things considered, it seems best for general use.

The tensile test, if properly made, is a good, though not a perfect indication of the value of a cement. The time requisite for making this test, whether applied to either the natural or the Portland cements, is considerable (at least seven days, if a reasonably reliable indication is to be obtained) and as work is usually carried on, is frequently impracticable. For this reason, short time tests are allowable in cases of necessity, though the most that can be done in such testing, is to determine if the brand of cement is of its average quality. It is believed, however, that if a neat cement stands the one day tensile test, and the tests for checking and for fineness, its safety for use will be sufficiently indicated in the case of a brand of good reputation. It cannot be said that a new and untried cement will by the same tests be proved to be satisfactory; only a series of tests for a considerable period, and with a full dose of sand, will show the full value of any cement; and it would be safer to use a trustworthy brand without applying any tests whatever, than to accept a new article which had been tested only as neat cement and for but one day.

**Fineness.**—The strength of a cement, especially when mixed with a large dose of sand, depends greatly upon the fineness to which it is ground. It is, therefore, recommended that the tests be made with cement that has passed through a No. 100 sieve (10,000 meshes to the square inch), made of No. 40 wire, Stubb's wire gauge. The results thus obtained will indicate the grade which the cement can attain, under the condition that it is finely ground, but it does not show whether or not a given cement offered for sale shall be accepted and used. Fineness is no sure indication of the value of a cement, although all cements are improved by fine grinding. Cement of the better grades is now usually ground so fine that only from 5 to 10 per cent. is rejected by a sieve of 2,500 meshes per square inch, and it has been made so fine that only from 3 to 10 per cent. is rejected by a sieve of 32,000 meshes per square inch. The finer the cement, if otherwise good, the larger dose of sand it will take, and the greater its value.

**Checking or Cracking.**—The following test for checking or cracking should never be omitted.

Make two cakes of neat cement 2 or 3 in. in diameter, about 1/2 in. thick, with thin edges. Note the time in minutes that these cakes, when mixed with water to the consistency of a stiff plastic mortar, take to set hard enough to stand the wire test recommended by Gen. Gillmore, 1/2 in. diameter wire loaded with 1/4 of a pound, and 1/4 in. loaded with 1 lb. One of these cakes, when hard enough, should be put in water and examined from day to day to see if it becomes contorted, or if cracks show themselves at the edges, such contractions or cracks indicating that the cement is unfit for use at that time. In some cases the tendency to crack, if caused by the presence of too much unslaked lime, will disappear with age. The remaining cake should be kept in the air and its color observed, which for a good cement should be uniform; the Portland cements being of a bluish gray throughout, yellowish blotches indicating a poor quality, and the natural cements being light or dark, according to the character of the rock of which they are made. The color of the cements when left in the air indicates the quality much better than when they are put in water.

**Tests Recommended.**—It is recommended that tests for hydraulic cement be confined to methods for determining fineness, liability to checking or cracking and tensile strength; and for the latter, for tests of seven days and upward, that a mixture of one part of cement to one part of sand for natural cements, and three parts of sand for Portland cements, be used, in addition to trials of the neat cement. The quantities used in the mixture should be determined by weight.

The tests should be applied to the cements as offered for sale. If satisfactory results are obtained with a full dose of sand the trials need go no further. If not, the coarser particles should first be excluded by using a No. 100 sieve, in

order to determine approximately the grade the cement would take if ground fine, for fineness is always attainable, while inherent merit may not be.\*

**Mixing, Etc.**—The proportions of cement, sand and water should be determined by weight, the sand and cement mixed dry, and all the water added at once. The mixing must be rapid and thorough, and the mortar, which should be stiff and plastic, should be firmly pressed into the molds with the trowel, without ramming, and struck off level. The molding must be completed before incipient setting begins. As soon as the briquettes are hard enough to bear it, they should be taken from the molds and be kept covered with a damp cloth until they are immersed. For the sake of uniformity, the briquettes, both of neat cement and those containing sand,

\* Your Committee thinks it useful to insert here a table showing the average minimum and maximum tensile strength per square inch which some good cements have attained when tested under the conditions specified elsewhere in this report. Within the limits given in the following table, the value of a cement varies closely with the tensile strength when tested with the full dose of sand:

#### AMERICAN NATURAL CEMENT, NEAT.

**One day:** One hour or until set in air, the rest of the 24 hours in water, from 40 to 80 lbs.  
**One week:** One day in air, 6 days in water, from 60 to 100 lbs.  
**One month:** (28 days), one day in air, 27 days in water, from 100 to 150 lbs.  
**One year:** One day in air, the remainder in water, from 300 to 400 lbs.

#### AMERICAN AND FOREIGN PORTLAND CEMENTS, NEAT:

**One day:** as above; from 100 to 140 lbs.  
**One week:** as above; from 250 to 550 lbs.  
**One month:** (28 days), as above; from 350 to 700 lbs.  
**One year:** as above; from 450 to 800 lbs.

#### AMERICAN NATURAL CEMENT, 1 CEMENT TO 1 SAND:

**One week:** as above; from 80 to 125 lbs.  
**One month:** as above; from 100 to 200 lbs.  
**One year:** as above; from 200 to 350 lbs.

**AMERICAN AND FOREIGN PORTLAND CEMENTS, 1 CEMENT TO 3 SAND:**  
**One week:** as above; from 80 to 125 lbs.  
**One month:** as above; from 100 to 200 lbs.  
**One year:** as above; from 200 to 350 lbs.

Standards of minimum fineness and tensile strength for Portland cement, as given below, have been adopted in some foreign countries.

**IN GERMANY.** By Berlin Society of Architects, Society of Manufacturers of Bricks, Lime and Cement, Society of Contractors and Society of German Cement Makers.

**Standard of 1877.**—Fineness, not more than 25 per cent. to be left on sieve of 5,806 meshes per square inch.

Tensile strength, one part cement, three parts sand, one day in air, 27 days in water, 113.78 lbs. per square inch

**Standard of 1878.**—Fineness, not more than 20 per cent. to be left on sieve, as above.

Tensile strength, same mixture and time as above, 142.23 lbs. per square inch.

**IN AUSTRIA.** By Austrian Association of Engineers and Architects.

**Standard of 1878.**—Fineness, same as German of 1878.

Tensile strength, same mixture as above, seven days, one day in air, six days in water, 113.78 lbs. per square inch.

Twenty-eight days, one day in air, 27 days in water, 170.68 lbs. per square inch.

In Austria a standard for the minimum fineness and tensile strength of Roman cement was established and generally accepted, as follows:

**Standard of 1878.**—Fineness, same as Portland.

Tensile strength (1 cement, 3 sand) for quick-setting cement (taking 15 minutes or less to set): Seven days, one day in air six days in water, 23 lbs. per square inch.

Twenty-eight days, one day in air, 27 days in water, 56.9 lbs. per square inch.

Slow-setting cement (taking more than 15 minutes to set): Seven days, as above, 42.6 lbs. per square inch.

Eight days, as above, 85.3 lbs. per square inch.

The man cements correspond to those classified in this report under the head of natural cements.

Standards have been adopted also in Sweden and Russia.

[As originally prepared the report read as follows, being subsequently modified to the more general form.—EDITOR.]

The tensile strength per square inch should not be less than about the following:

American natural cement, neat:

In 24 hours, 1 hour or until set in air, the balance of the 24 hours in water, 50 lbs.

In 7 days, 1 day in air, 6 days in water, 80 lbs.

In 28 days, 125 lbs.

American and foreign Portland cements, neat:

In 24 hours, 1 hour or until set in air, the balance of the 24 hours in water, 110 lbs.

In 7 days, 1 day in air, 6 days in water, 300 lbs.

In 28 days, 1 day in air, 27 days in water, 400 lbs.

American natural cement, 1 cement to 1 sand:

In 7 days, 1 day in air, 6 in water, 40 lbs.

In 28 days, 1 day in air, 27 in water, 100 lbs.

American and foreign Portland cement, 1 cement, 3 sand:

In 7 days, 1 day in air, 6 in water, 90 lbs.

In 28 days, 1 day in air, 27 in water, 120 lbs.

should be immersed in water at the end of 24 hours, except in the case of one-day tests. Water of a temperature of 60 to 70 deg. Fahr. should be used. The proportion required varies with the cement and the temperature of the air, but is approximately :

Neat cement, Portland, about 25 per cent.; natural, about 30 per cent.

One cement, 1 sand, about 15 per cent. of total weight of sand and cement; 1 cement, 3 sand, about 12 per cent.

The object is to produce the plasticity of rather stiff plasterer's mortar.

An average of five briquettes may be made for each test, only those breaking at the smallest section to be counted. The briquettes should always be put in the testing machine and broken immediately after being taken out of the water, and the temperature of the briquettes and of the testing room should be constant between 60 and 70 deg. Fahr.

The stress should be applied to each briquette at a uniform rate of about 400 lbs. per minute, starting each time at 0. With a weak mixture one-half the speed.

**Weight.**—The relation of the weight of cement to its tensile strength is an uncertain one. It is of little value as a test.

**Setting.**—The rapidity with which a cement sets or loses its plasticity, furnishes no indication of its ultimate strength. It simply shows its initial hydraulic activity.

For purposes of nomenclature, the various cements may be divided arbitrarily into two classes, namely: quick-setting, or those that set in less than one-half an hour; and slow-setting, or those requiring one-half an hour or more to set. The cement must be adapted to the work required, as no one cement is equally good for all purposes. In submarine work a quick-setting cement is often imperatively demanded, and no other will answer, while for work above the water-line less hydraulic activity will usually be preferred. The slow-setting natural cements should not become warm while setting, but the quick-setting ones may, to a moderate extent, within the degree producing cracks.

**Sampling.**—Usually, where cement has a good reputation, and is used in large masses, the testing of every fifth barrel should be sufficient; but in very important work, where the strength of each barrel may in a great measure determine the strength of that portion of the work where it is used, or in the thin walls of sewers, etc., etc., every barrel should be tested, one briquette being made fr. m. it.

Take the samples from the interior of the original packages, at sufficient depth, and store the same in tightly closed receptacles impervious to light or dampness until required for manipulation, when each sample of cement should be thoroughly mixed, by sifting or otherwise.

**Sieves.**—For ascertaining the fineness of cement, it will be convenient to use three sieves, viz.:

No. 50 (2,500 meshes to the square inch), wire to be of No.

35 Stubb's wire gauge.

No. 74 (5,476 meshes to the square inch), wire to be of No.

37 Stubb's wire gauge.

No. 100 (10,000 meshes to the square inch), wire to be of No. 40 Stubb's wire gauge.

The object is to determine by weight the percentage of each sample that is rejected by these sieves, with a view not only of furnishing the means of comparison between tests made of different cements by different observers, but indicating to the manufacturer the capacity of his cement for improvement in a direction always and easily within his reach.

For sand, two sieves are recommended, viz.:

No. 20 (400 meshes to the square inch), wire to be of No. 28 Stubb's wire gauge.

No. 30 (900 meshes to the square inch), wire to be of No. 31 Stubb's wire gauge.

These sieves can be furnished in sets, as follows, an arrangement having been made with a manufacturer<sup>\*</sup> of such articles, by which he agrees to furnish them of the best quality of brass wire cloth, set in metal frames, the cloth to be as true to count as it is possible to make it, and the wire to be of the required gauge. Each set will be inclosed in a box, the sieves being nested.

Set A, three cement sieves, to cost \$4.80:

No. 100 ..... 7 in. diameter.

No. 74 ..... 6 1/2 " "

No. 50 ..... 6 " "

Set B, two sand sieves, to cost \$4.00:

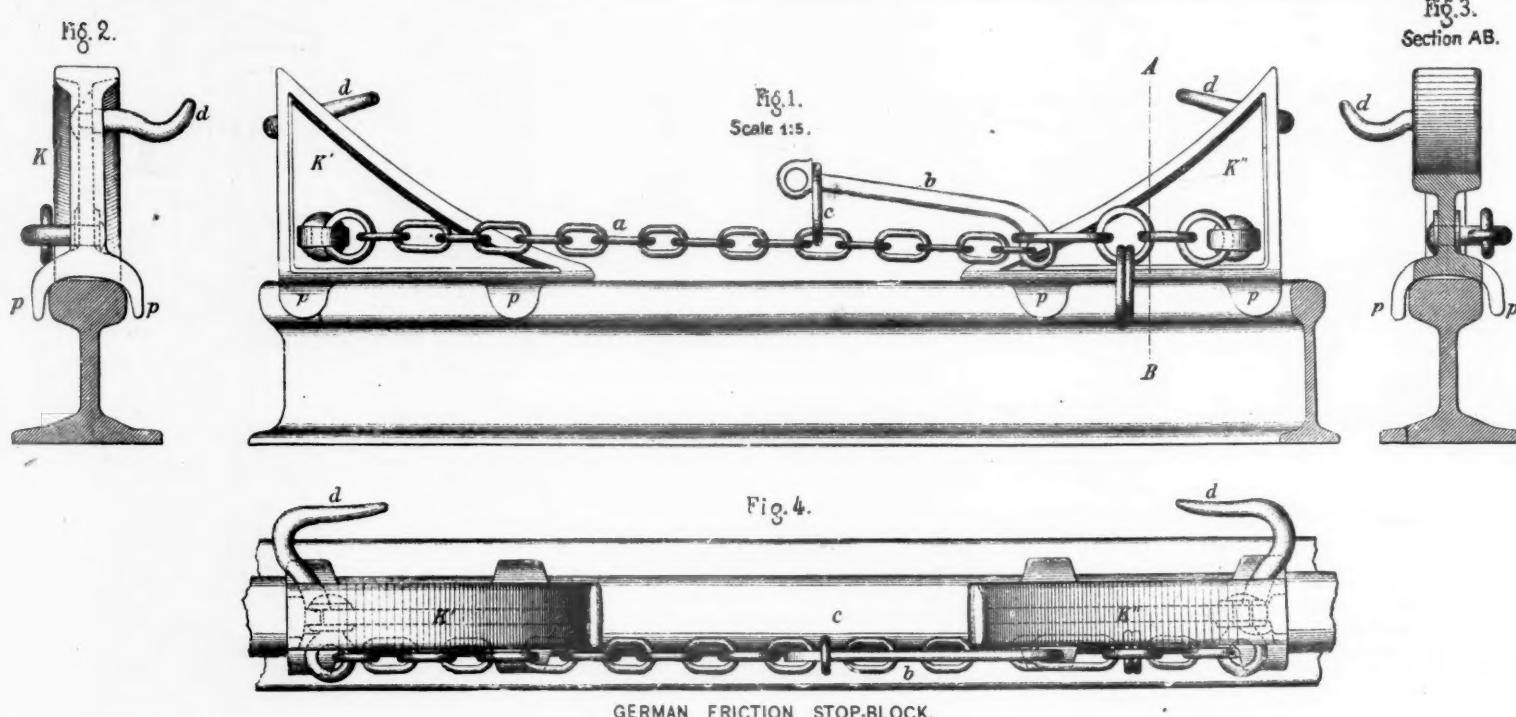
No. 30 ..... 8 in. diameter.

No. 20 ..... 7 1/2 " "

**Standard Sand.**—The question of a standard sand is of great importance, as it has been found that sands looking alike and sifted through the same sieves give results varying within rather wide limits.

The material that seems likely to give the best results is the

\* Williams' Globe Wire Works, No. 85 Fulton street, New York city.



GERMAN FRICTION STOP-BLOCK.

crushed quartz used in the manufacture of sand-paper. It is a commercial product, made in large quantities and of standard grades, and can be furnished of a fairly uniform quality. It is clean and sharp, and although the present price is somewhat excessive (3 cents per pound), it is believed that it can be furnished in quantity for about \$5 per barrel of 300 lbs. As it would be used for tests only, for purposes of comparison with the local sands, and with tests of different cements, not much of it would be required.

The degree of fineness should be such that it will pass a No. 20 sieve and be caught on a No. 30 sieve. Of the regular grade, from 15 to 37 per cent. of crushed quartz No. 3 passes a No. 30 sieve, and none of it passes a No. 50 sieve. As at present furnished, it would need resifting to bring it to the standard size, but if there were sufficient demand to warrant it, it could undoubtedly be furnished of the size of grain required at little, if any, extra expense.

**Molds.**—The form recommended is shown in the engraving. They cost from \$2 to \$3.

**Clips.**—[The form recommended is that illustrated. The committee point out that it is a matter of much importance to get fair tests, but the details are of importance only to the manufacturers of testing machines, and no doubt have been or will be embodied in any machine furnished.—EDITOR.]

**Amount of Material.**—The amount of material needed for making five briquettes of the standard size recommended is, for the neat cements, about  $1\frac{1}{2}$  lbs., and for those with sand, in the proportion of 3 sand to 1 cement, about  $1\frac{1}{4}$  lbs. of sand and  $6\frac{1}{2}$  oz. of cement.

The committee consisted of Gen. Q. A. Gillmore, Chairman; D. J. Whittemore, J. Herbert Shedd, Eliot C. Clarke, Alfred Noble, F. O. Norton, W. W. Maclay, Leonard F. Beckwith and Thos. C. McCollom.

#### German Friction Stop Block.

Several forms of friction stop blocks or buffers attached to and sliding on the rails have come into use during the last few years, and some of the appliances for this purpose have been illustrated and described in these columns.\* The friction stop block we now illustrate differs from these appliances not only in detail, but in the fact that it is designed to prevent a vehicle moving in either direction, while the other stop blocks referred to prevent motion in one direction only. It is, moreover, not calculated to arrest an engine or car already in motion, but it is intended to prevent a car once brought to rest on a side track from being accidentally or maliciously moved.

The accompanying illustrations show a track brake designed by L. Vojáček, an engineer of Prague, in Bohemia, and described by him in the *Organ for Railroad Progress*. Its object is to hold fast cars or other rolling stock on side tracks or at stations, especially where the tracks are inclined, and to make sure that they cannot get loose, either by any accident or by the stealing of the apparatus. On both sides of the same wheels are placed two wedges  $k'$  and  $k''$ , of strong wrought metal, which rest on the rail as shown in the illustrations, each block having four flanges. These two wedges are coupled together in the simplest way from the outside. It is not necessary to draw them tight up to the wheel, but only within an inch or so.

This coupling is effected by means of the small lever  $b$ , which hangs on a chain of some length,  $a$ , attached to the wedge  $k'$ . On the wedge  $k''$  are a few free links, whose lengths differ from each other by only 5, 10 and 20 millimeters (0.2, 0.4, and 0.6 in.). The lever  $b$  is thrust through one of these free links of the wedge  $k''$ , turned down and passed through the free link  $c$ , and the chain  $a$ . The hooks,  $d$ , attached on the inside of the two wedges, make it entirely impossible to draw them out, even when somewhat loosely coupled, as long as the lever  $b$  is kept through the link  $c$ . In order absolutely to lock the brakes a padlock may be put through the eye  $w$  at the end of the lever  $b$  and locked with a key.

This apparatus is indestructible and answers its purpose

\* Broomhall's portable stop block was illustrated in the *Railroad Gazette*, Aug. 1, 1884, and Shaw's friction buffer, Sept. 19, 1884.

completely. When gently struck by a loaded train or a locomotive, the brakes do not go on all at once, but the station brake slides along with the car for a few yards, and then stands still again. If the car were empty and elastic and a loaded train on a locomotive should run against it, if the coupling were tight there would be danger of racking the car. This danger is avoided, it is true, by using a long coupling chain and throwing it over the axle. But this is an awkward way; and experience shows that safety is secured better by not drawing the coupling chains quite tight, which, for that matter, it is not easy to do, unless the lever lock is adopted.

This apparatus is very light and easy to handle (38½ lbs. in two pieces), and has answered completely in practice. The two wedges, in case of need, can be used for arresting runaway cars. The patentee delivers them anywhere in Germany for \$6 a pair.

#### Experiments in Car Lubrication in France and Belgium.

In the *Revue générale des Chemins de Fer* for October, 1885, Mr. L. Salomon gives an interesting account of the results of experiments made by the Eastern Railroad of France to determine the comparative advantages of bronze and white metal for journal bearings, and of colza oil, Péchelbronn (a kind of mineral oil) and Russian petroleum residuum for lubricating, the standard of excellence being fixed by the number of hot boxes for a given length of run, the consumption of oil and the cost of oil and attendance.

The test does not, therefore, take any account of the relative friction, in which, as shown by Herr Grossmann in the book recently reviewed by us, the experimenters appear to be correct, since the difference between the best and the worst oils for axle purposes is, so far as their friction is concerned, an insignificant element.

The experiment with Péchelbronn oil extended over 11 months, with the result of 1.1287 hot boxes per 100,000 kilometers (62,187.5 miles) for bronze bearings, and .083 hot box per 100,000 for white-metal bearings.

As two of the hot boxes found with bronze bearings occurred in December, during unusually cold weather, and

were attributed to the use of summer instead of winter oil, Mr. Salomon corrects the results, and, comparing them with the use of colza, they stand as follows:

	Kiloms.
Hot boxes with bronze bearings and colza oil...	0.163 per 100,000
" " " Péchelbronn oil...	0.772 " "
" " " wb. metal "	0.083 " "

On the face of these returns one would pronounce the colza the better oil and the white metal the better bearing, unquestionably. With the latter conclusion the authorities of the railroad are in accord, but they adopted the Péchelbronn oil in preference to the colza, presumably, and justly, because it cost only 2.46 cents per pound, against 5.98 for the colza oil. The oiling cushions have, moreover, kept in better condition with the mineral oil than with the colza.

Trials with Russian petroleum turned out much more to the advantage of the latter, as during 9 months' trial, including all the winter months, no case of hot box occurred with either bronze or white-metal bearings, and the condition of the oiling cushions was superior to that with either of the other oils.

The experiments on the Péchelbronn oils were conducted with a maximum pressure on the bearings of 308 lbs. per square inch, and those with the Russian oil with 347 lbs. per square inch.

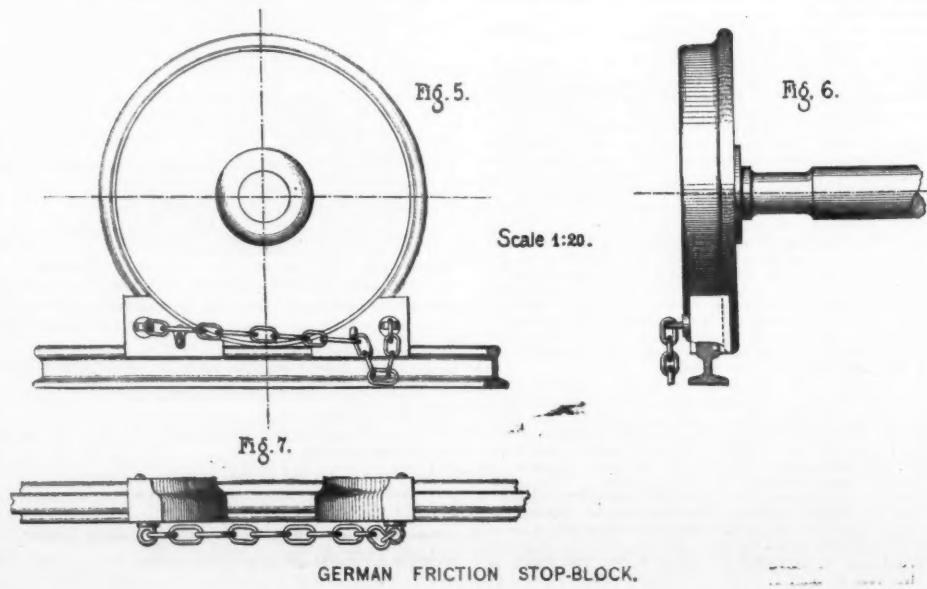
The sleeping cars on the Oriental express out of Paris having given a great deal of trouble, it was resolved to try what a change of oil and bearings would do for them. There were seven of these vehicles fitted with swiveling trucks, but the pedestals and the spring connections were so badly proportioned as to throw very uneven strains on the journals, causing in a year's service eight hot boxes and 68 warm ones, requiring 56 renewals of oiling cushions.

The use of the Russian oil not proving an entire remedy for the difficulty, the bearings were altered so as to decrease the pressure per square inch from 270 lbs. to 241 lbs., and the bearings were faced with white metal, and at last reports, after running 314,221 axle box miles, no case of heating of any sort had occurred.

The results obtained showed that :

1st. The mineral oils could be used in the same boxes as the colza.

2d. The substitution of the mineral oils did not increase the



GERMAN FRICTION STOP-BLOCK.

Number of test.	OIL TESTED.	Dealer.	Density at 30° F.	P. c. of tar .....	Freezing point, F., inflammable .....	Degree of fluidity by Barbey's ixometer.						
						At 32° F.	At 68° F.	At 95° F.	At 122°	At 167°	At 212°	
						Point, F. ....	.....	.....	.....	.....	.....	
1	Crude colza .....	A. & Co.	0.915	16.5	30°	21°	20.4	84.0	143.4	286.8	492	
2	Russian naphtha residue .....	A. & Co.	0.912	16.5	30°	17°	4.8	43.2	94.4	247.2	492	
3	" "	M. & Co.	0.907	15.0	27.4°	16°	6.0	24.0	55.8	126.6	31.0	576
4	" "	G. & Co.	0.912	16.0	35.2°	17.4°	5.4	41.5	91.0	246.6	477	
5	" "	V. C. & C.	0.907	15.0	24.7°	16°	4.8	22.8	55.8	105.6	274.5	540
6	Crude Pechelbronn for oiling .....		0.917	15.0	26.0°	24°	1.5	67.2	148.8	372.0	678	
7	" " for gas .....		0.863	7.0	16.1°	32°	1.0	52.5	73.2	10.0	....	
8	Tarry residue of American petroleum .....		0.920	23.5	31.2°	25°	0.0	15.6	52.2	116.4	280.8	531
9	American black oil .....		0.885	15.0	35.2°	32°	0.0	22.2	50.4	111.6	262.8	442
10	Clear American oil .....		0.912	3.0	32.5°	32°	0.0	89.4	17.4	330.	645	1068
11	Residue of Kouban naphtha .....		0.905	28.0	29.1°	17.4°	0.0	6.4	18.6	50.4	162.	378
12	Oleinaphtha No. 0 Ragozine Co. ....		0.912	6.0	37.0°	17.4°	3.6	14.2	39.0	89.8	231.5	519
13	No. 1 .....		0.997	5.0	36.1°	14°	6.4	27.0	61.3	129.0	336.0	671
14	No. 2 .....		0.899	5.0	33.7°	-4°	21.5	53.9	141.0	257.0	556.0	968

number of hot boxes, and in the case of the Russian petroleum, markedly decreased it.

3d. The mixture of the mineral with the vegetable oil in the same box had no objectionable effect.

4th. The quantity of oil consumed was precisely the same for mineral as for vegetable oil.

5th. The substitution of the mineral oil allowed the period between inspections of the oiling apparatus to be doubled with decided economy in repair account.

6th. Bronze bearings were still permissible under well proportioned running gear (the author seems to have an overpowering affection for bronze bearings).

The low temperature at which Russian petroleum congeals renders it advantageous, particularly for all out-door oiling.

The economical advantages of the mineral oil are presented as follows :

With a system using 3,818 fast running vehicles of all classes, and 26,659 freight cars, the consumption of colza oil costs about \$60,000 a year, and the cost of inspection and taking care of the apparatus is \$106,052.

With mineral oil the items are respectively \$36,000 and \$39,748, making a total saving of \$90,304, or 61.49 per cent. of the total expense of oiling.

The Grand Central Railroad of Belgium has used the residue of distillation of Russian oil since 1830 for its rolling stock and shops on the following basis :

Mineral oil without mixture, at all seasons, for locomotive cylinders.

Mineral oil without mixture, September to April, inclusive, for all axles.

Mineral oil without mixture, inclusive, for locomotive machinery.

Fifty per cent. mineral oil and 50 per cent. colza, May to August, inclusive, for last 2 classes.

Ten per cent. mineral oil and 90 per cent. colza, all the year, for workshop machinery and rolling stock oiled in the shop.

The exception effected by this last rule to the usual oiling of rolling stock is apparently for the purpose of avoiding the necessity of keeping more than one kind of oil on hand in workshops.

This method gives an average use of half mineral and half colza in the total consumption of the road.

It is stated that 5 per cent. of petroleum (presumably the refined oil as distinguished from the residue) is added both to the rolling stock and machine shop oils during the months from September to January inclusive.

The engineers of the Grand Central, of Belgium, have limited the proportion of mineral oil for the rolling stock, because the pressure on car journals is very excessive, rising to 770 lbs. per square inch. This practice seems to be contrary to the more generally received practice, of less fluid oils for heavy pressures, but it was adopted after an extensive trial of pure mineral oil in 1884, from which it was shown that the number of hot boxes with mineral oil was greater than with colza in the winter months, while the reverse was true in the summer months.

An examination of the accompanying table of fluidity of oils at varying temperatures offers a plausible explanation of this phenomenon :

From this table it appears that colza is nearly as fluid at 32° as the Russian oil or American black oil at 68°. Now it may be assumed safely that too little fluidity is even more objectionable than too much, and supposing the mineral oil to be about fluid enough at 68°, it is obvious that in freezing weather the colza would have an advantage until a partial heating of the axle and the adjacent oil took place; and if the colza were a better lubricator in itself than the mineral oil, which is probably the case if its axle remained cold, it would retain its advantage even after the other oil had been rendered more fluid by heat.

The Belgian Grand Central road uses now exclusively bronze bearings, the results of its experiments with phosphor bronze having been unfavorable.

The axle boxes are inspected at least once a year, the result of which is generally only examination of its condition and the renewal of the oil. If necessary, the oiling pad or the bearing is renewed, and the box cleaned.

No statement is made of the frequency of oiling. About 10 cents (50 centimes) per car for each axle box examination is distributed among all the employés—including both inspectors and workmen—who have had to do with it, and \$2 (10 francs) is deducted from the sums due on the above account for every hot box occurring within 60 days after an inspection by workmen and inspectors from the main shop, \$1 per box for ordinary station forces whose work has allowed a hot box to occur within the same period after their inspection. A special fine of 10 cents is laid upon a workman who has

been detailed to attend to one or more boxes of a car set out on account of heating, if a hot box occurs on the same car within a week after the repair.

The Belgian Grand Central used colza exclusively from 1873 to 1877, and the hot boxes averaged 1.364 per 100,000 car-kilometres, while the results of 1884 with mineral oil exclusively were 1.105 per 100,000 car-kilometres.

The Barbey ixometer, by which the table was obtained, is the invention of Mr. L. Barbey, Assistant Chief of the Laboratory for Material and Traction of the Eastern Railroad of France.

In it, in order to produce greater resistance to the flow and consequently greater precision as well as accuracy than the ordinary viscosimeter affords, he has introduced a capillary tube through which the oil passes under a constant head. The capillarity, in connection with the desirable exactness of dimension, is obtained by passing a carefully turned stem exactly through the centre of an equally accurately bored tube of slightly greater diameter.

By immersing the feeding tube and the capillary tube in a water bath of uniform heat the experiment is conducted with oil of any desired temperature, and the fluidity is measured by the quantity of oil passed in a given time.

#### The St. John Bridge & Railway Extension Company.

The suggestion of the St. John Bridge, which was described and illustrated at length in the *Railroad Gazette* of Oct. 30, 1885, page 690, may be traced back, perhaps, to 1835, when the "Quebec & St. Andrews Railway Association" was organized by residents of St. Andrews, on Passamaquoddy Bay, and proposed building a railroad through territory claimed by both Maine and New Brunswick. In 1850, at a meeting in Portland, Me., the "European & North American Railway" was proposed, and in 1853 work on it was begun in Maine, but the line was not completed between Bangor, Me., and St. John, N. B., until 1872. The company became bankrupt in course of time, the part of the line in Maine being leased to the Maine Central, and the New Brunswick portion in 1883 being transferred to the New Brunswick Railway Company.

A bridge at the falls of the St. John had always been part of the design for the completed road, but the various management had been unable to secure the construction of one, for lack of means; communication was maintained by a branch line, opened in 1871, to the west side of St. John harbor at Carleton and a steam ferry thence to St. John.

Among the chief promoters of the project for the bridge recently completed was the late Mr. Wm. Parks, for some years President of the European & North American Company in New Brunswick, and Mr. Thos. R. Jones, then a director in that company and now President of the company which owns the bridge. About 1876 the new proprietors of the railroad obtained plans for a bridge by well-known local engineers, prepared under the supervision of an eminent English engineer, but money could not then be obtained to carry these out.

In 1877 the change of the gauge of the roads between St. John and Bangor, from the old Canadian 5½ ft. gauge to the standard gauge, made possible an interchange of freight with all railroads west of Bangor such as had never been possible before, and business improving about 1878, and there being a prospect of largely increased trade between the maritime provinces and New England, at the suggestion of Mr. James Murray Kay, Manager of the St. John & Maine Railway, which had been the New Brunswick section of the European & North American, "The Provincial & New England All-Rail Line" was formed in 1880, consisting of the St. John & Maine, the European & North American (St. John River to Bangor), the Maine Central and the Eastern Railroad. The ferry at St. John was felt to be a serious disadvantage to this line, which must for most of its traffic compete with steamers on the open sea, and so needs to be expedited in order to offer any considerable advantage to shippers.

On application of officers of this line, associated with leading railroad men in New Brunswick, and supported by the governments of New Brunswick and Nova Scotia, and the commercial interests of St. John and Halifax, the St. John Bridge & Railway Extension Company was incorporated in 1881, the incorporators being Thos. R. Jones, Frederick E. Barker, Charles Spear, Payson Tucker, John H. Parks, James Murray Kay and Robert Robinson, authorized to build a bridge and the railroad necessary to connect it with the Intercolonial Railway in the city of St. John.

Surveys for a line and a bridge at the falls had been made several times—in 1850 and 1851, 1857 and in 1869. On substantially this route, whose advantages for a bridge had

been elaborately described by the engineers Wilkinson and Morton in 1850 and 1851, the bridge has been built.

The present directors of the company owning the bridge are Thos. R. Jones, Robert Robinson, John H. Parks, James Murray Kay, Frederick Barker, Payson Tucker and Arthur Sewall, with Thomas Barclay Robinson as Secretary.

#### Early Locomotives in the National Museum.

The "John Bull" engine, the locomotive brought to this country from England in 1831, and remarkable from the fact that it was in actual continuous service for over 30 years, has been placed on exhibition in the main hall of the National Museum at Washington. This venerable and curious looking locomotive half a century ago pulled a train of two or three cars or coaches, looking like old-fashioned stage coaches mounted on car wheels, and was considered a wonder of modern science and mechanical skill. It is intended to form a part of a collection in the museum, which will tell the story of the development of steam as a motive power in transportation.

Mr. J. Elfrith Watkins, who is in charge of this department, has just left for Europe in search of drawings, models, etc., which will render this department of the museum more complete. In a recent interview Mr. Watkins states :

" Among the earliest railroads in this country was a road from Quincy granite quarries, Massachusetts, to the Neponset River, a distance of several miles. The road was built of strips of granite put on the ground as you build a curbstone, and upon these granite rails ran cars with flanges on the wheels to carry the granite to the wharf. There was another road built very early at Mauch Chunk, Pennsylvania. It was laid with transverse cross ties of logs unheated, but notched to receive roughly hewn longitudinal rails of wood. Upon these rails were run cars used to take coal from the mine to a coal wharf on the Lehigh River. The Baltimore & Ohio was a very early railroad. Twelve miles of railroad, from the city of Baltimore to Ellicott's Mills, was perhaps the first piece of railroad regularly operated in this country. Its construction was begun in 1828. It is hoped we will be able to obtain from this company one of their old grasshopper engines, which was shown at the Chicago railroad exhibition. The first 100 miles of railroad built and operated in this country was in South Carolina, and upon that road the first three American built locomotives were used; the first about 1830. An engraving from the original drawings of each of these locomotives will be exhibited in my section."

" The Camden & Amboy Railroad, which was destined to be the great highway of travel between New York and Philadelphia, ordered the engine 'John Bull,' which is on exhibition here now, through its President, Robert L. Stevens, who was sent to Europe for the purpose in the fall of 1830. The engine was built by Robert Stephenson & Co., Newcastle-on-Tyne, was shipped in May and arrived at Bordentown, N. J., the last week in August, 1831. It was put together and run for the first time early in September, 1831. It is a rather interesting fact to note that the man who put it together and first ran it, Isaac Dripps, was the same who placed the rudder after the propeller. This engine when it arrived in the country was substantially as it now is—with inside cylinders, four driving wheels and multitubular boiler. The driving wheels originally had cast-iron hubs and locust spokes and felloes and tire about 5 in. wide and flanged, shrunk on like the tire of an ordinary cart-wheel. There was no headlight, no bell and no pilot. The steam-pipes were inside the boiler and the dome was right over the fire-box. In the dome was a lock-up safety-valve, which the engineer could not reach. There was no cab, and no tender came with the engine. To take its place when the first experiments were made, a ten-ton barrel was made of an ordinary construction car, with a whisky barrel to hold the water, which was fed to the engine through hose made by a shoemaker out of leather, connected with the tank by waxed thread.

" When this engine arrived in this country it was the most perfect locomotive in the world. It had been built by George Stephenson's firm as an improvement on the 'Planet,' which, built in 1830, was the first engine which had the combination of horizontal cylinders, multitubular boiler, and the blast pipe. The 'John Bull' was the first engine running in this country which possessed these three essential features of a locomotive, for lack of which earlier engines in both countries were comparative failures.

" The 'John Bull' was first used to demonstrate to the Legislature of New Jersey, which had been asked to charter a steam railroad, that the use of steam on railroads was to be the thing of the future. It was tried before the legislature of the state November, 1831, and was so successful that the Legislature granted to the Camden & Amboy the privileges that they asked.

" After a trial, made on a short piece of track then constructed, the engine was stored in a shed to await the completion of the balance of the track. At that time a man named Peale, who had a large museum in Philadelphia, became anxious to have a toy engine built to run on a circular track in his museum. He arranged with Baldwin, a mathematical instrument maker and a man of ingenuity, who went to Bordentown, where the engine was stored, and, in connection with Isaac Dripps, made an examination of her. He then built a toy locomotive, which was exhibited as a curiosity for a number of months. The managers of the Philadelphia, Germantown & Norristown Railroad saw this toy locomotive, and ordered a locomotive of regular size from Baldwin. It was built in 1832 and called 'Old Ironsides.' With its construction began the history of the Baldwin Locomotive Works, the largest of their kind in the world. A number of others went into the business, but the Camden & Amboy Railroad was for a number of years looked upon as being the pioneer in locomotive construction in and about Philadelphia and New York, although the Baldwin & Ohio Co., in the construction of the grasshopper, brought out a type which was commercially successful for the peculiar requirements of the business which the road entered upon, and their invention should not be overlooked.

" I will be able to show a drawing of the first locomotive that ever performed work continuously in the world," said Mr. Watkins. " It was built by Trevithick and was run on the Merthyr Tydyl railroad in Wales as early as 1804, and was used to haul pig iron from a furnace to a wharf. Trevithick was an advocate of high pressure, and his engine apparently had smooth tires, horizontal cylinders, driving spur gearing and a return flue boiler, the fire being in an internal chamber and urged by the exhaust escaping up the chimney.

" When Robert L. Stevens was on the ship on his way to Europe to order the 'John Bull,' in 1830, he devoted a considerable amount of time to whittling out cross-sections of what he thought would be a good kind of iron rails to lay on the railroad. The best rail then known was the T rail without any base. This style had been adopted by all the most important roads in Europe. Owing to its peculiar shape, it required a chair on every cross-tie or stone block, as the case might be. Stevens was the first man to design the rail which he termed the 'H' rail—in other words, a rail with a base which could be spiked with 'hooked-headed' spikes directly to the bearing. Under the 'John Bull' engine are two of the

original rails rolled from the first design of Robert L. Stevens in 1830. When the exhibit is complete the rails will rest on the original stone blocks made at Sing Sing, New York, for this road, and we will use a spike, similar to the original 'hooked-head,' to join the rails to the wooden pins in the holes in the stone blocks. Those rails have iron tongues, the rudimentary splice-plates of the present day. They were attached to the rails by rivets put on hot. Thus we see that as early as 1830 there was in use on the Camden & Amboy Railroad tracks substantially what is now the American railroad splice bar and railroad spike. These have been improved in shape and made stronger to meet the requirements of an increased amount of traffic, but the ideas approved now, after a lapse of 55 years, are substantially the same. The wooden cross-ties have taken the place of the stone blocks, which, owing to expense and rigidity, had to be abandoned a few years after they were first laid. The standards of track adopted by the first successful railroads of the country at different times will be shown by models; cross-sections of different forms of rails will be shown, together with models of different kinds of frogs, switches, etc. It is the intention to bring these illustrations up to the present time, so that we will have a correct history of the birth and development of the American railway system during the first half century of its existence.—*Washington Evening Star.*

#### Foreign Technical Notes.

The Belgian state railroads are again about to experiment with metallic sleepers. About 10 years ago a considerable length of road was laid with two of the systems most used in Germany at the time, but the result was so unsatisfactory that no more were used, though the bad condition of the iron manufacture in the country made the government anxious to use iron if possible. Now it advertises for 35,000 rolled iron-steel cross-ties of the Post (Dutch) pattern, to weigh 165 lbs. each; 35,000 of the same system, but with a modified section (Braet's), and 5,000 of the Bernard system, which consists of two U-shaped bars fastened together at a little distance apart, so that the ballast may penetrate the interior, likewise to weigh 165 lbs. each. It is not expected that they will be as cheap as wooden ties; at current prices for rails they would cost about \$1.80 each, but they will be dearer than rails. Oak ties cost about \$1 each in Belgium.

The statistics of the use of iron sleepers on German railroads shows the following numbers of miles of railroad laid with longitudinal and with transverse sleepers at the end of the fiscal year ending March 31:

	1880-81.	1881-82.	1882-83.	1883-84.
Longitudinal .....	2,050	2,427	2,641	2,946
Transverse .....	814	1,263	1,934	2,524
Total.....	2,864	3,690	4,575	5,470

The increase from year to year continues very large, and now cross-ties are laid much more than longitudinal sleepers, contrary to what was occurring a few years ago. Since 1880-81 the additions to the longitudinal system have been 896 miles, or 43½ per cent.; to the transverse system, 1,710 miles, or 210 per cent. Judging from the reports of the experience with the two systems, it seems strange that any additions to the longitudinal sleepers should be made. The total mileage of metal sleepers has nearly doubled in three years. In no other European country is there yet any large mileage of these sleepers. In 1883 in Austria-Hungary, Holland, and Belgium there were altogether 234 miles, most of it in Holland, but there has since been a considerable addition to the mileage in Austria. The chief users of these sleepers are the Prussian state railroads, and one of the chief arguments urged for adopting them is "the relief of the suffering iron industry."

The German *Organ* gives an interesting obituary biography of Julius Pintsch, the inventor of the well-known gas-lighting apparatus for cars and locomotives.

He was born in 1815 in Berlin, and learned the brazier's trade, setting up in 1843 a small shop for himself. He was employed by the Berlin Gas Co. to repair its gas-meters, which had until then been made exclusively in England. Through Pintsch's improvements, however, the supply of these articles for Germany was gradually transferred to his establishment, which soon began also to export them to Austria and Russia. In 1867 the government gave Pintsch an order for building torpedoes, of which business he maintained a monopoly by his reliable workmanship during the war years 1870-71. In 1868, by the invitation of the Lower Silesian & Mark Railroad to furnish a good gas-lighting system for its cars, Pintsch was started in the work with which his name is chiefly associated. Instead of using coal-gas, which was the approved English system, Pintsch turned his attention to oil-gas, at that time in very bad repute.

By his ingenuity a complete and admirable system of lamps and gas-making apparatus was devised, which has spread all over the world, there being now over 100 filling stations and about 15,000 vehicles fitted with his lamps. I has also been applied very successfully to vessels. Herr Pintsch successively enlarged his workshops, built a new establishment in 1872 on the banks of the Spree, near Berlin, which factory was again constantly increased in size until death closed the busy career of its proprietor, Jan. 28, 1884.

#### SIGNALS TO ENGINEERS.

In a recent number of the German *Magazine* an engineer addresses to his comrades of the government board a warning which covers one point in which our own practice needs reform.

He calls upon the engineers not to mind irregular signals, such as beckoning and calling. All over Europe train signals are given by whistles, like boatmen's whistles, or by horns. No one who has had much to do with our roads can have failed to notice the very great lack of discipline in this matter among train-hands. When a freight engine is switching, three or four men give motions a great part of the time, a practice which must lead to more than a few minor accidents.

Hand signals, when the giver can be recognized by the person to whom the signal is addressed, are probably better than any whistle or horn signals, but waving of hands by several persons at once all within sight of the engineman ought to be strictly prohibited, and no engineman should move his train without distinctly recognizing the signal-giver as one of his own train gang or a yard official authorized to direct him. This requirement would make special distinctive lanterns necessary, a matter involving some little complexity in this apparatus, but not as much as might at first appear, owing to the limited number of cases where lanterns of the same kind could lead to misunderstanding as to the person carrying them.

#### SWITCHING BY HORSE POWER.

The Berlin Direction of the Prussian State Railroads has found it advantageous to use horses for switching to a very considerable extent instead of engines. At the Mochbein station, near Breslau, there is a system of 18 parallel switching tracks, ranging in length of standing room from 600 to 2,200 ft. These were cross-connected by switch crossings, and 14 of them ran out at the east end into a pull-out track, and at the west end all connected with a gravity switching track rising from the yard 1 in 100. The switches run over from the gravity track were all operated from one point by levers, and at the foot of the gravity track was a signal mast with arms by which the switch-tender could be shown which track was wanted.

For serving this yard up to 1881 four switching engines were used, two by day and two at night, which were able to work at breaking up trains from both ends, the western one being helped out by the gravity track, 25 cars being pulled up at once until they cleared the end switch 600 ft., which sufficed to give the necessary speed for setting them in upon the desired track.

This arrangement worked well, but in 1881 an attempt made to handle the business with horses convinced the authorities that they were the cheaper motor, and the work has been done since then with 10 horses by day and 10 by night. Five horses work together in breaking up a train, and single ones do the distribution. No care is taken to run the cars together on the tracks where they belong, this being left to the line engine which is to take them out.

It takes about the same time to switch with horses as with engines, what is lost in speed being gained in saving of travel and of delays caused in communicating between the brakemen and the enginemen.

At this particular station three to five horses are used in local freight switching, which was formerly also done by the switch-engines, so that six horses take the place of one engine. The six horses cost \$9.45 per day, including drivers and harness, while an engine, including repairs and train hands, costs \$10.

This apparently does not take into account the interest on the cost of the engines, while the cost of the horse traffic is the actual hire of the animals and of the men employed with them. Further elements favorable to horses which cannot be stated in figures are the less wear and tear of rolling stock, and the saving to rails and switches, by avoiding engines; and also the much greater safety to all employees concerned.

Even if in our large yards, owing to the high cost of labor, horses' switching should not appear profitable, there can be little doubt that it would be much more profitable to employ horses at many way stations where a whole train is now held for the local switching necessary, to say nothing of the inconvenience of having business await the arrival of a train where a horse or two would enable loading and unloading to proceed without break or hindrance.

#### TECHNICAL.

##### Locomotive Building.

H. K. Porter & Co. in Pittsburgh last week shipped a locomotive to Pottsville, Pa. They are building a shifting engine for the Troy Iron & Steel Co. at Troy, N. Y.; one for a brick-making firm on the Hudson River and one of 2 ft. gauge to go to Canada.

The Brooks Locomotive Works in Dunkirk, N. Y., are to build several passenger engines with 18 by 24 in. cylinders and 68 in. drivers for the Cleveland, Columbus, Cincinnati & Indianapolis road. These works have just completed two locomotives for the Cincinnati & Eastern road.

The Cincinnati, Hamilton & Dayton shops in Lima, O., have just completed a new locomotive with 17 by 24 in. cylinders and 60 in. drivers. The boiler is 54 in. diameter.

##### The Car Shops.

The Pullman Car Shops at Pullman, Ill., are to build 100 passenger cars for the new Kings County Elevated road in Brooklyn, N. Y. They will be similar to those in use on the New York elevated lines.

A controlling interest in the Union Foundry and Pullman Car Wheel Works at East Roseland has been bought by the Pullman Co., and George M. Pullman has been elected President, A. Davies Auditor, and E. G. Shumway General Manager. The works are of immense size and were owned principally by N. S. Bouton and others before the transfer.—*Chicago Industrial World.*

The John Stephenson Co., limited, in New York has just completed 40 cars for the new Northern Central street road in St. Louis.

The Keith Manufacturing Co., at Sagamore, Mass., is building 50 box cars for the Old Colony road.

The Fort Worth & Denver City shops in Fort, Worth, Tex., have just completed 23 freight cars for the road.

##### Bridge Notes.

The Phenixville Bridge Co. has just completed the new bridge over the Mississippi at Keokuk, Ill. The bridge is 2,050 ft. long in all, having eight fixed spans and a draw-span 385 ft. long.

The Morse Bridge Works, in Youngstown, O., have received an order for two iron viaducts, 1,500 ft. long in all, in Omaha, Neb. The works are now running full time on orders.

The Vermont Construction Co., in St. Albans, Vt., has

taken a contract for an iron railroad bridge at Woburn, Mass., for the Boston & Lowell road.

##### Iron and Steel.

The demand for railroad supplies is lively. One firm has just obtained an order from a New York railroad company alone for \$28,000 worth of car links and pins. The Vulcan Forge & Iron Works, at Chartiers, with 16 puddling furnaces, is on double, making car axles. All kinds of rolling stock supplies are manufactured at the Pittsburgh Forge & Iron Works and at the Twenty-ninth street mill of Carnegie, Phipps & Co., where 31 puddling furnaces, and the majority of the finishing rolls are on double, making from the three mills about 150 tons a day, giving work to about 1,500 men. The demand for all kinds of light iron is very good. J. Painter & Sons are very active. The machinery is in operation day and night, producing about 800 net tons every week. Lindsay & McCutcheon, in Allegheny, produce about 250 tons a week. The finishing rolls and 18' puddling furnaces are on single turn, but 21 furnaces are on double turn. About one-third of the muck iron made at the American Rolling Mill. The finished output each day will reach at least 150 net tons.—*Pittsburgh Chronicle-Telegraph.*

Bushong Furnace, in Reading, Pa., has been obliged to put one stack out of blast on account of difficulty in obtaining coke.

The Shelby Iron Co. is making extensive improvements at its blast furnaces at Shelby, Ala. One stack is being rebuilt.

The Scranton Steel Co. in Scranton, Pa., has put its works on full double time in all departments.

Mancelona Furnace at Mancelona, Mich., has been sold to parties who live in Grand Rapids, Mich. They have organized a company and will put the furnace in repair and start it up as soon as possible. It is a charcoal furnace.

##### Manufacturing and Business.

The Industrial Works at Bay City, Mich., have just shipped one of their latest designed pillar cranes, of large capacity, to the Union Pacific Railroad, for use at Pocatello, Idaho. The New York Central & Hudson River Railroad has recently contracted with them for engine, boiler and all machinery necessary for a complete system of freight conveyors at their Ohio street station in Buffalo. They are also engaged upon orders for railway cranes and cars for the Pittsburgh, Fort Wayne & Chicago and the Cleveland & Pittsburgh roads, as well as a steam shovel for the Chicago & West Michigan, and are just completing a rail sawing outfit for the Michigan Central. This company last year built a number of steam pile drivers for railways of an original design. There are now several of these machines under way in the shops.

The Ashcroft Manufacturing Co. will remove from Boston to its new and elegant shops in Bridgeport, Conn., about April 1. The building and outfitting of these works are a model in every particular. A Babcock & Wilcox boiler furnishes steam for the testing-room and for three Westinghouse engines, and takes its feed-water from a Davis pump, through a Gouber purifier.

The Pratt & Whitney Co., in Hartford, Conn., is running its shops over-time in several departments to keep up with its orders.

The Pawtucket Manufacturing Co., in Pawtucket, R. I., has added several new tools and is increasing its facilities for making bolt and nut machines.

The American Brake Co. in St. Louis is adding a number of new tools to its shops in St. Louis and is building an addition to make needed room on the floors.

The Patent Shaft & Axletree Co., of Wednesbury, England, represented in the United States by W. R. Ellis (New York and Boston), has made arrangements with Krajewski & Pesant, proprietors of the Erie Basin Iron Works, South Brooklyn, N. Y., to put together its wrought-iron wheels, the centres of which are imported, with any kind of steel tire that may be desired.

##### The Rail Market.

*Steel Rails.*—The market is steady, with quotations at \$34.50@\$35 per ton at mill for ordinary lots, with \$34 named for heavy orders. There has been a good deal of business done, chiefly in small lots.

*Rail Fastenings.*—Increasing demand is reported, with quotations at 2.40 cents per lb. for spikes in Pittsburgh: 2.75@\$3.10 for track bolts, and 1.70@\$1.80 for splice bars.

*Old Rails.*—Old iron rails are dull, with a large supply and quotations entirely nominal at \$21.50@\$23 per ton at tidewater. Old steel rails are in less demand and are quoted at \$22.50@\$24 per ton in Pittsburgh.

##### Electric Lighting.

Westinghouse, Church, Kerr & Co. have contracted with the Homer-Ramsell Transportation Co. to light their teamsters—"Newburg" and "Fishkill-on-Hudson"—by the Westinghouse system. This system of electric lighting is also to be introduced in the Union Depot at Pittsburgh: the Adams Express building in Philadelphia; the Wheeling Steel Works in Wheeling, W. Va., and a number of other large factories and mills. The Westinghouse Machine Co. in Pittsburgh has recently received orders for a number of Westinghouse engines, from 15 to 75 H. P., to run electric lighting plants.

##### The Forth Bridge.

The foundations of this great work are now practically finished, and the erection of the smaller approach spans has commenced. The 12 great piers for carrying the two 1,700 ft. spans are finished with the exception of a few courses of masonry on the Inchgarvie south-east pier and the Queensferry north-west pier, the work on the latter pier being much delayed by the tilting and subsequent bursting of the caisson. All the other piers are built to the height of the under side of the viaduct girders. On the north side of the Forth the five girders are being raised gradually to the required height, and although the length of the girders is 800 ft., and the weight 1,000 tons, they were lifted in one piece by the hydraulic appliances provided as easily and as safely as a small girder was lifted by an ordinary crane. On the south side of the Forth the viaduct girders were ready to be lifted in the same manner. During the past six months about 6,500 tons of steel had been delivered at Queensferry.

##### An Electric Suburban Railroad.

The Minneapolis, Lyndale & Minnetonka Co., which runs a suburban line out of Minneapolis, has been trying experiments with the Vandepole electric motor on its line, with such satisfactory results that, is it stated, a contract has been closed for 8 electric motors and a complete plant for running the road by electricity. This electric equipment, it is stated, is to be furnished as soon as it can possibly be completed.

##### Experiments with Cast Steel.

Some very interesting experiments with regard to the cellular structure of cast steel have been carried out at the Creusot Works by MM. Osmond and Werth. They found that if the thinnest conceivable sheets of the metal are placed on glass and covered with azotic acid, the iron will be dissolved, while the skeleton remaining, revealing the distribution of the carbon in the steel, will, on examination by the microscope, furnish undoubted evidence that such distribution is

by no means uniform, and that the cast steel consists of minute granulations in soft iron, separated, for the most part, by partitions made up of a different substance, a carburet of iron. In other words, cast steel is cellular in structure, the iron constituting the kernel and the carburet of iron the shell. The elementary or simple cells thus constituted come together in composite cells or separate agglomerations in the thin sheets, which are thus rendered transparent by empty lines. These latter outline closed polygons of relatively large dimensions in the cast-steel, but the polygons become smaller and broken up proportionately to the more perfect manipulation of the metal.—*Universal Engineer*.

#### A High-Speed Engine.

During the last year or two it has come to be generally understood that large machines, driven at a comparatively low speed, were the best for electric lighting purposes; but the lighting at the Lincoln's Inn dining hall and library must be considered as an exception to this rule. The dynamo here is driven at no less than 12,000 revolutions per minute, by a Parsons high-speed engine, which justifies its title by running at the same rate. It requires some mental effort to take a statement of this kind seriously; yet there is no reason to regard the Parsons motor as a toy. It was shown in action at the Inventions' Exhibition, running with unimpaired steadiness from the commencement to the close of the show. It is, in reality, a combination of turbines driven by steam, and consists of two series of parallel-flow turbines to the right and left of a central steam inlet, the steam exhausting directly from the first turbine into the second, from the second into the third, and so on through 20 turbines in each series. The steam parts with a portion of its energy in each turbine, and finally escapes at a pressure not much above that of the atmosphere. It is claimed that this is the first motor that has ever been made to work at the actual velocity of the steam as it escapes from the boiler.—*Engineer and Iron Trades Advertiser*.

#### Locomotives in Italy.

The following figures, taken from a paper contributed to the Institution of Civil Engineers, shows the number of locomotives placed upon the principal lines of Italy and the countries where they were constructed:

	Germany, Austria, Switzerland.	Eng- land.	France and Belgium.	Italy.	Total
From 1847 to 1865 ....	36	245	334	87	702
" 1866 to 1875 ....	80	40	267	83	470
" 1876 to 1885 ....	322	36	7	171	536
Total .....	438	321	608	341	1,708

There are only three firms in Italy which make locomotives, and one of these has recently become bankrupt. An average of 17 locomotives per annum divided among three firms does not seem to indicate any great prosperity of business in the Italian locomotive building trade. The Germans appear to have the greater part of what business there is, but even their contribution only amounts to 32 engines per annum.

#### THE SCRAP HEAP.

##### A Valuable Train.

A train of 16 cars loaded with silk, *en route* overland from San Francisco to New York, passed through Buffalo yesterday. The route is the Central and Union Pacific, Chicago, Milwaukee & St. Paul, Michigan Central and New York Central roads. The value of the shipment is over \$1,000,000, and the time schedule from ocean to ocean is 13 days.—*Buffalo Express*, Feb. 25.

##### Very Considerate.

" You are the manager of the road?"  
" Yes, sir; what can I do for you?"  
" I see you are cutting rates to California."  
" Yes, sir."

" Well, I called to see if I could get a pass, I didn't like to ask for one when the rates were up—don't like to be too hard on you, you know—but now that they're way down, of course I ain't asking so much."—*St. Paul Pioneer Press*.

##### A Friendless Locomotive.

Engine No. 140, which was wrecked at Scio the night that Engineer Allen was killed, has been rebuilt and has been running on the Western division for about a month. The engine prior to the night of the fatal accident had many admirers on the division, but her friends have all deserted her now. Nobody seems to care about taking charge of her, and she has been placed on the "rounds," having no regular engineer. A few months ago this engine drew the fastest express on the road. Now it is with difficulty that she can get a freight train over the division on time. It is impossible to keep steam on her, and it is said she frequently "lays down" on the road. Firemen say she is "no good," and none of them are desirous of the laborious duty of trying to "keep her hot."—*Hornellsville (N. Y.) Times*.

##### A Narrow Escape.

Train 5 had a narrow escape from a bad accident one morning last week. When approaching the depot at Carrollton the porter on one of the sleeping coaches felt that the car was not proceeding with its usual easy motion. An examination was made by the trainmen, when it was found that a piece of the flange, 10 in. long, had been broken from one of the wheels. Some of the bolts had also worked loose, and it was quite evident that the car could not have proceeded much farther without being thrown from the track. There were two other coaches behind, and there is no telling what the consequence would be had the car left the track. It is probable that the flange had been cracked for some time and when the air brakes were applied the defective piece was broken off. The coach was left at Carrollton and the train proceeded onward without much delay.—*Hornellsville (N. Y.) Times*, Feb. 24.

##### No Drinking Men Wanted.

The Fall Brook Coal Co., which employs over 1,000 men in its mines and on its railroads in the semi-bituminous coal region of Tioga County, Pa., conducts its business on the strictest temperance principles. In December, 1882, the company adopted a rule that any employé who was known to use intoxicating drinks should be dismissed from the company's service. The rule is known as "Rule No. 1." Since then the company has discharged over 300 of its railroad hands, and nearly as many other employés for violating the rule. At first the company re-employed discharged men on satisfactory evidence that they had reformed, but the trial was made with but five men. Every one of them broke the rule the second time. Then no excuse would recover a discharged man his place. When an employé is detected in using liquor or beer, the money due him is placed in a blue envelope and handed to him. The receipt of a blue envelope is notice that the man is discharged, and that under no circumstance

can he ever again obtain employment of the company, even as a track repairer.

The strict enforcement of the rule has forced some of the oldest and best men in the service of the company out of its employ, but Rule No. 1 will not be varied from to save the most valuable man on the pay roll. A person applying for work to the Fall Brook Co. must present a certificate that he is a teetotaler, and must sign a pledge that he will continue to abstain absolutely from intoxicating drinks while in the service of the company, whether on duty or not. Since this rule was adopted by the coal company the list of fatalities in its mines and on its railroads has decreased 50 per cent., and the employés all have money ahead.—*Elmira (N. Y.) Letter in New York Sun*.

##### Why Arthur Kill Should not Be Bridged.

It having been urged that experience on the Mississippi and Missouri rivers has proved that bridges over navigable channels are not to be prevented by the vessel interest, and that therefore the Baltimore & Ohio should be permitted to bridge the Arthur Kill between New Jersey and Staten Island, "Captain Jake, of the 'Mary Ann,'" responds as follows in the *Bayonne (N. J.) Times*:

"The above is all very well for the Mississippi and Missouri rivers, but when you come to the Arthur Kill it's a different thing. The Arthur Kill flows between New Jersey and Staten Island—to put a bridge across the stream would be an outrage. When the tugboat *John Henry* is coming up the Arthur Kill with a long rope out pulling along the canal boats *Mary Jane*, *Ann Eliza*, *Mary Ann*, *Josephine Thompson*, right alongside of *William Henry*, *Harry Snodgrass*, *Charles Skinner*, *Napoleon Bonaparte*, *Jay Gould*, and *Cyrus Field*, all loaded—with coal—they got to pass under a bridge? Have the passengers who are standing on the deck of the *Mary Jane* viewing the salt meadows and the fertilizing manufacturers, as they sail up the Arthur Kill, all got to duck their heads, when the man at the tiller sings out, 'Low bridge?' Not much! No bridge will be allowed by the state of New Jersey to cross the Arthur Kill! It is all very nice to talk of the bridge being made high enough so that *Mary Jane* and her friends can go under it without ducking their heads; but suppose bad boys stand on the bridge, and when *Mary Jane* is going under the bridge they spit on her new hat or use a bean shooter on the man at the tiller? These things, perhaps, you have not thought of."

##### Brakemen Down East.

The freight brakemen wear very heavy clothing, although it is always short, as they have to get around in a hurry sometimes. I have known the time when I was braking on a freight train, when the train was running 15 or 20 miles an hour against sleet and snow, and a call had come for "down brakes." At such a time I have been sitting on the top of the car, so stiff and frozen as to be unable to work the brakes at all. We do not mind the cold weather so much on the freights as when there is snow on the ground and on the cars. Then it becomes very dangerous, as when the train is running 20 miles an hour the snow and sand will be hurled up between the cars enough to blind a man, and with the ice-covered cars and running as we do, from one car to another, perhaps with our lanterns blown out, it is pretty dangerous, and a man has to be sure-footed and have his wits about him to brake on a freight in the winter time. Many of the passenger brakemen live at the way stations down the road, such as Stratford, New Rochelle, Mount Vernon, Milford and other stations, and when they finish their work at one end of the road they take an express train back, and as it passes the station at which they live, although the train may be going at the rate of from 15 to 25 miles an hour, they will jump off and keep their feet, although they have to run perhaps the length of the train before they stop themselves, but still they seldom, if ever lose their feet. It is quite a trick to jump off, and takes considerable practice before it can be done successfully. The way to jump is always with the train and on the left hand side of the latter, letting the right foot rest on the step and the left foot swing from the step. Then jump so that the left foot will strike the ground first and the right foot immediately follow it, so as to be able to run. Some of the men jump from the middle of the train or the front, but most of them go to the rear car and jump, so that if they fall they will not roll under the cars. The only regular trainman I ever heard of being injured by jumping was a man named Davis, who lives in Portchester, and who was struck on the head by the car step as he jumped and was badly hurt. The best man I ever saw, and the only man who could hold his feet and stop himself without running at all, was Charles Phillips, who lives on Court street in this city, and who is now a conductor on the Derby road. He could jump from a train running 35 miles an hour and stop without running a foot. Another good man who was nearly as good a jumper as Phillips, was John C. Gallagher, of Putnam street, this city, who is conductor of the New York day freight out of here.—*A Brakeman in New Haven (Conn.) Journal*.

##### Pathfinders.

" Hold on there!" yelled a policeman to a citizen who was speeding himself toward the station just as the train was pulling out, "what are you after?" "I'm after time!" howled the panting citizen. And it was so.

"I am going to Hartford," said the passenger who climbed on at the water tank. "How much will I owe you?" "Not one cent," replied the conductor cheerfully. "You pay as you go, and keep out of debt." So he did.

You will observe that the man who has been waiting in the dreary desolation of a country station three mortal hours, never complains that the train is slow after he gets on. A construction train flagging itself along at 7 miles an hour, seems like the sweep of a comet to him.

"What makes you look so dismal?" asked the engineer. "Best girl hasn't gone back on you, has she?" "No," said the baggageman, ruefully looking at a paper in his hand, "but I've been sued for breeches of promise by my tailor. The ones I have on, too," he added mournfully.

"I see," remarked the fat passenger, "that a railway in Europe has been laid with paper rails." "That's nothing new," replied the director, sorting over his annuals. "We built this entire road on paper twenty years ago, and the more paper we use the more money we make."

The old lady with the big spectacles and cotton gloves sat up straight as a ram, and glared at the good commercial traveler sitting beside her, as the train shot out of the tunnel into daylight. "I smell spirits in this car," she said, with the air of a woman who nose what she smells. "Yes, mam," said the good commercial traveler meekly, as he stroked his silken mustache with the back of his hand. "So do I, mam. Car seems to be full of 'em. Brakeman forgot to close it, and they must have got in through the trance, some."

"Your life," said the parson solemnly, "is hanging by a thread." "I know it," replied the impudent brakeman, "and you can just bet your life I'm going to hang on to her just as long as the thread lasts." "Young man," said the parson, "don't be too dead sure of that. I went to see a man last week who talked just that way, but after he had been hanging on about fifteen minutes the doctors pronounced him dead as a herring, while the thread he was hanging to was sound as a dollar and strong as a bell-cord." The brakeman took a tract, and went forward to read it.

"This train," said the music teacher, "is like a pipe organ,

it has so many stops. "Or a song," said the sad passenger, "because it's so low." "Or a waltz, there's so many slurs on it," said the dude. "And it's marked with accidentals," suggested the man with the sample case. "And the road is full of turns," said the sad passenger. "And the management is thorough base," said the cross passenger. "And anybody can beat its time," said the fat passenger. "But it can't be played by flats," remarked the conductor. "Tickets, gentlemen, and da capo." But they didn't care to repeat.—*Burdette, in Pathfinder Guide for March*.

##### The Oldest Locomotive Fireman.

A dispatch from Tamaqua, Pa., March 3, says: "William Higgins, who died on Sunday last in his 86th year, and was buried to-day, was not only the oldest resident of this place, but the first locomotive fireman in America. In 1831 the Little Schuylkill Railroad Co. purchased three locomotives in London, and they were brought here to take the place of the horses used on their road between this point and the canal at Port Clinton. George Mahn and John Bowe accompanied the engines to this country and put them in running order. Higgins, a miner, was assigned to the first engine put in order, the 'Comet,' to act as fireman; Robert Burt, who was also working in the mines of the company, was made engineer."

##### RAILROAD LAW.

##### Taxing Sleeping Cars.

The United States Supreme Court on March 1 decided the suit of the Pullman Southern Car Co., brought to recover money paid under protest as taxes levied by the state of Tennessee, and by certain counties in that state on the company's cars running through the state. The case has been under litigation for a number of years, and the final decision is that the Pullman Southern Co. is entitled to recover the money, the tax not having been legally levied.

##### Taxes on Capital Stock—Charter Exemption.

The United States Supreme Court on March 1 gave its decision, affirming that of the lower court, in the case of the State of Tennessee against the Treasurer of Davidson County. This case involved the assessment and collection of taxes on the stock of the Nashville & Decatur and the Nashville, Chattanooga & St. Louis roads. The state originally filed a petition for a *mandamus* to compel the County Treasurer to assess for taxation the stock in these companies in 1885, insisting that the shares were subject to assessment not only for that year, but for previous years. Had this claim been supported the stock would have been liable for some 20 years back taxes. The defendants claim that the shares were exempt from taxation under the terms of the charter of the companies and secured the removal of the cases to the United States Circuit Court. That Court decided that the stock was exempt and that the petition for a *mandamus* should be dismissed, and the Supreme Court now sustains this decision.

##### Municipal Aid to Railroads in Nebraska.

In the case of the State, *ex rel.* City of Lincoln, against Babcock, the Nebraska Supreme Court holds as follows:

1. A city has authority under the statute to donate to one or more railroads or other works of internal improvement its bonds not to exceed in the aggregate 10 per cent. of the assessed valuation; and bonds issued for water works owned by the city, or other city purposes are not to be computed in making up the aggregate which the city may donate.
2. The authority for a city to issue bonds to aid in the construction of railroads or other works of internal improvements is expressly conferred by section 1, chapter 45, Compiled Statutes.
3. The word "aid" as used in the statute may include donation.
4. The provision in the constitution requiring the Secretary and Auditor of State to indorse on bonds issued as a donation to a railroad or other works of internal improvement that said bonds were "issued pursuant to the law" requires no legislation to carry it into effect, but it is the duty of such officers in a proper case to make such indorsement.
5. The provision applies to all bonds issued for that purpose; and not alone to the 5 per cent. in excess of the 10 per cent. first issued.
6. Sec. 31, chapter 9, Compiled Statutes authorizes a city in proper case to institute a proceeding to compel the certification of bonds issued by such city.

##### Railroads and Express Companies.

A Washington dispatch of March 1 says: "In the United States Supreme Court to-day a decision was rendered in the case of the Missouri, Kansas & Texas Railway Co. and others, appellants, vs. Wm. B. Dinsmore, as President of the Adams Express Co. and as a shareholder therein. These suits present substantially the same questions. They were each brought by an express company against a railroad company to restrain the railroad company from interfering with or disturbing in any manner the facilities theretofore afforded the express company for doing its business on the railroad of the railroad company.

The question presented was the right of railroad companies to refuse to carry express matter and the agents and messengers of the express companies over their lines. The railroad companies claimed the right to transport express matter over their lines in cars selected by themselves and under the control of their own employees. The lower Court decided in favor of the express companies.

The Chief Justice delivered the opinion of the Court. He held that it was not shown in the testimony that any railroad company had ever held itself out as a common carrier of common carriers. The question, he said, was whether these express companies can now demand as a right what they have heretofore had only as a favor. That depends on whether the railroad companies are by law charged with the duty of carrying all express companies in the way that express carriers are usually carried just as they are with the duty of carrying all passengers and freights when offered in the way that they are carried.

The Constitution and the laws of the states in which the roads are situated place the companies on the footing of common carriers, and there is nothing in positive terms requiring the railroad companies to carry the express companies in the way that under some circumstances they might be able to carry one company. Such being the case, the right of the express companies to a recovery depends upon their showing the existence of a usage having the force of law in the express business, which requires railroad companies to carry all express companies on their passenger trains as express carriers are usually carried. The question is not whether these railroads must furnish the general public with reasonable express facilities, but whether they must carry these particular express carriers for the purpose of enabling them to do the express business over their lines.

The decree is reversed, and the suit is remanded with directions to dissolve the injunction, and, after adjusting the question between the parties for business done while the injunctions were in force and decreeing the payment of any amounts that may be found to be due, to dismiss the bills. Justice Matthews took no part in the decisions of these cases. Justices Miller and Field dissented from the opinion."



Published Every Friday.

## EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies; the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present ONLY SUCH MATTER AS WE CONSIDER INTERESTING AND IMPORTANT TO OUR READERS. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

## THE PENNSYLVANIA RAILROAD REPORT.

The directors' report of this company, which is all that is published at this time, gives a very meagre account of the operations of the company, only the gross earnings from all sources, and not those from passengers and freight separately, and the working expenses in a lump for each division, and not the expenses under different heads. All this in great detail is given in the reports of the officers published later; but they would receive much more attention if they were given in the directors' report, as the principal facts used to be, and they are needed to enable one to appreciate the course of the company's business, or to compare it with that of other railroads.

The gross and net earnings and working expenses of the whole system east of Pittsburgh and Erie were made known more than a month ago. We have seen that the gross earnings were the smallest since 1881 and the net earnings the smallest since 1879, and that the result of the operation of the lines west of Pittsburgh and Erie was the most unfavorable since 1878, so that the net earnings of the eastern plus the surplus or minus the deficit of the western system had been for seven years.

Year.	Year.
1879.	\$15,861,179
1880.	19,707,077
1881.	20,062,711
1882.	20,326,728

being one-fourth less last year than in either of the three years 1881, 1882 and 1883, and 18 per cent. less than in 1884.

The aggregate earnings and expenses of the eastern and the western systems, including in the latter the controlled lines (Chicago, St. Louis & Pittsburgh, Grand Rapids & Indiana, and St. Louis, Vandalia & Terre Haute) have been for four years:

Gross earnings.	Expenses.	Net earnings.
\$101,514,926	\$85,385,714	\$36,120,212
103,653,532	68,917,056	36,736,476
97,849,875	64,434,317	33,415,558
92,994,549	61,690,961	31,303,648

The immense system which yielded these earnings included about 5,204 miles in 1882, 5,325 in 1883, and 5,540 in 1885; but with this increase of 2 per cent. in mileage (almost wholly in Pennsylvania) since 1883, we see that there has been a decrease of \$12,659,000 (11 per cent.) in gross earnings, and of \$5,433,000 (14½ per cent.) in net earnings.

In gross earnings the decrease was \$7,804,000 from 1883 to 1884, and \$4,855,000 from 1884 to 1885; in net earnings a decrease of \$3,321,000 from 1883 to 1884 is followed by a decrease of \$2,112,000 from 1884 to 1885. The decline in 1884 was therefore considerably greater than in 1885.

The great decrease in earnings has not been due to a falling off in traffic, this having been on the above systems:

Ton-miles:	E. of Pittsburgh.	W. of Pittsburgh.	Total
1882	4,862,702,539	2,719,844,763	7,582,547,302
1883	5,066,683,173	2,683,140,873	7,759,234,048
1884	5,114,912,159	2,576,669,303	7,691,581,492
1885	5,486,165,363	2,883,675,415	8,369,840,778

Passenger-miles:	1882	1883	1884	1885	
748,484,865	369,346,960	1,117,834,834	830,883 (16½ per cent.)		
789,134,915	366,774,204	1,155,9,9,139	814,827,710	342,588,887	1,157,4,6,597
876,839,905	357,589,531	1,234,388,436			

It appears thus that while the earnings were smaller the traffic was larger last year than any other of the four. Compared with 1883, there has been an increase of nearly 8 per cent. in freight traffic and of 6½ per cent. in passenger traffic, while there has been a de-

crease of 11 per cent. in gross earnings. There was, however, but a small increase in traffic from 1883 to 1884, and the gain of 9 per cent. in freight and 6½ per cent. in passengers from 1884 to 1885 was doubtless wholly due to the excessively low rates, which diverted freight from the water routes. It will be observed that west of Pittsburgh both passenger and freight traffic decreased from 1882 to 1884, probably owing to the opening of new lines for through traffic.

The traffic, it will be noticed, is very much denser on the eastern than the western system, the amount per mile of road having been last year:

Ton-miles.		Passenger-miles.	
Eastern.	Western.	Eastern.	Western.
2,440,050	894,440	3,0,0,0	110,903

Which is equivalent to the following numbers of tons and passengers moved each way daily over the entire mileage:

Tons.		Passengers.	
Eastern.	Western.	Eas. ern.	Western.
3,343	1,225	534	152

so that the movement per mile of road of freight is 2½ times as great and of passengers 3½ times as great on the eastern as on the western system:

The report does not show the earnings per ton and per passenger per mile on the Western system, but on the Eastern system they have been:

Ton-mile.			Passenger-mile.			
Rec't.	Cost.	Profit.	Rec't.	Cost.	Profit.	
1876	0,915	0,600	0,255	2,0,6	1,055	1,001
1877	1,013	0,615	0,308	2,323	1,734	0,530
1878	0,939	0,545	0,394	2,309	1,712	0,597
1879	0,824	0,480	0,344	2,255	1,709	0,546
1880	0,918	0,540	0,378	2,222	1,674	0,548
1881	0,857	0,517	0,340	2,276	1,615	0,601
1882	0,871	0,554	0,370	2,249	1,663	0,586
1883	0,881	0,562	0,319	2,297	1,626	0,671
1884	0,84	0,514	0,286	2,258	1,621	0,637
1885	0,695	0,460	0,235	1,950	1,460	0,484

The average freight rate increased for two years after 1881, when reduced by the railroad war, but it has decreased since 1888 much more than it had increased, and decreased more last year than in any other one year except from 1878 to 1879. The reduction in the cost per ton per mile was little more than half the reduction in the receipt, and the profit was reduced 18 per cent. The reduction in the average passenger rate was 13½ per cent., and in the profit per passenger mile was 24 per cent. The rate of \$1 for immigrants from New York to Chicago had something to do with bringing down the average, though the immigrant travel is a very small part of the whole. Last year, though the total immigration was less than the previous year's, the Pennsylvania doubtless had more than ever before, as it carried nearly all of it. It yielded a little more than 0.1 cent per mile. With the rates of 1884 last year's freight traffic (on the eastern system) would have yielded \$2,743,000 more and the passenger traffic \$1,815,000 more profit than was actually realized, and this would have made the net earnings \$2,150,000 greater instead of \$1,900,000 less than the year before, and made them larger than ever before. There can be no doubt, however, that if the rates of 1884 had been maintained the traffic would have been materially smaller.

This report shows on the Philadelphia & Erie Division, as has happened in some previous years, a smaller cost per ton per mile than on any other railroad in the world, namely, 0.807 cent. But the Pennsylvania Railroad Division is not far behind it with a cost of 0.391 cent per mile, which is, we believe, a lower cost than has ever been shown by any other road with numerous branches and a large local traffic. More than five-sixths of this division consists of branches. That the very low rates of the year were due to the through traffic is indicated by the fact that there was an increase of 30½ per cent. in the east-bound and 7½ per cent. in the west-bound through freight over the main line.

Examining the accounts of the different divisions, we find that the New Jersey lines had scarcely any decrease in gross earnings and had an increase of \$435,574 (11 per cent.) in net earnings, which were larger than ever before. This is a surprising result, for though only one-fifth of this system is main line and likely to suffer greatly from low through rates, less than one-sixth of the Pennsylvania Railroad Division is main line, and on that division the gross earnings were reduced 8 per cent. and the net earnings no less than 17 per cent. The Philadelphia & Erie, which is all main line and with a light local traffic, had a decrease of 10 per cent. in gross earnings and 11½ per cent. in net earnings.

The net earnings of the whole system east of Pittsburgh were largest in 1883, and the decrease from these was \$3,200,883 (16½ per cent.). But the decrease on the Pennsylvania Railroad Division has been \$3,249,638, or 28½ per cent., so that it may be charged with the whole of the decrease. There was, it was true, a decrease of \$195,240 (18 per cent.) on the Philadelphia & Erie, but this was more than made good by the increase of \$243,195 (6 per cent.)

on the New Jersey lines. The improvement of the result on the latter is a fact of considerable importance, for there has been a loss on the lease of these lines in every year except the Centennial year (1876), when there was the large profit of \$1,127,422. These losses have been:

Year.	Loss.	Year.	Loss.
1874	\$31,161	1881	\$302,825
1875	67,666	1882	563,750
1877	1,482,518	1883	593,515
1878	1,136,775	1884	593,536
1879	938,889	1885	150,497
1880	1,133,309		

If in a year so generally unfavorable as last year the loss was so small, it may be hoped that in fair years hereafter there will be no loss, and this very likely will be the case should there be no considerable diversion of traffic to a new line between New York and Philadelphia.

The financial result of the operations of the entire property of the company is given below for three years:

	1885.	1884.	1883.
Net earnings Penna. R. R.	\$10,440,771	\$12,621,778	\$13,896,400
Div. from investments, etc	4,853,070	4,489,774	4,676,960
Total income	\$15,299,841	\$17,111,552	\$18,773,360
Interest and other charges	7,146,158	6,926,023	6,429,928
Loss on New Jersey lease	150,497	593,536	653,915
Purchases of guaranteed securities	58,621	600,000	600,000
Sinking fund	324,830	277,460	280,860
Allegheny Valley deficit	701,575	698,320	661,010
Fred. & Pa. Line deficit	15,000	15,000	15,000
Am. Steamship Co. advances	90,000	—	180,000
Old claims and charged off for depreciation	388,855	1,020,692	863,452
Advance to Pa. Co.	1,000,680	—	—
Total charges	\$8,859,673	\$10,131,031	\$9,424,165
Balance	\$5,440,168	\$6,980,521	\$8,849,195
Per \$100 of stock	\$5.74	\$7.45	\$10.10
Dividends	4,738,892	6,580,787	7,530,650
Surplus	\$701,275	\$410,734	\$1,418,545

The profits, after meeting all prior charges, are seen to have fallen from \$10.10 per share in 1883 to \$7.45 in 1884 and \$5.74 in 1885. This, however, does not show the whole decline; for the amounts expended for guaranteed securities and for sinking funds add so much to the property of the company, and the reduction in these since 1884 has been \$496,009, which is more than 50 cents per \$100 of stock, and the amount charged off for "old claims and depreciation," was reduced \$657,357, or nearly 70 cents per \$100 of stock.

The advances to the Pennsylvania Company were to meet the loss incurred in working the western leased roads, which loss seems to have been met otherwise than from the Pennsylvania Railroad's income in 1884. The loss on this system was formerly entirely on the more southern lines having their outlet by the Pittsburgh, Cincinnati & St. Louis, while there was a large profit on the Pittsburgh, Fort Wayne & Chicago. Now there is a large loss on the northern and but a small one on the southern system. The northern system, worked directly by the "Pennsylvania Company," including the Pittsburgh, Fort Wayne & Chicago, the Cleveland & Pittsburgh, the Erie & Pittsburgh, the Jeffersonville, Madison & Indianapolis and several shorter lines, 1,370 miles in all, have had the following earnings, etc., for 5 years:

Year.	Gross earnings	Expenses	Net earnings	Rentals, int., etc.	Surplus or deficit.
1885.	\$15,377,228	\$10,457,702	\$5,234,526	\$6,337,341	Def. \$1,028,816
1884..	16,472,283	10,844,901	5,627,322	6,314,038	" 714,631
1883..	19,147,948	11,961,293	7,181,050	6,395,846	Surp. 75,204
1882..	19,025,661	10,976,120	8,049,541	6,181,163	" 1,869,378
1881..	19,788,671	10,760,215	9,028,456	6,167,744	" 2,167,732

Thus in all this time the result has been getting worse and worse, until the lines which in 1881 yielded a profit of \$2,860,000, last year netted a loss of \$1,052,815. The profit was equal to 3.7 per cent. on the stock of the Pennsylvania Railroad Company in 1881; the loss was equal to 1.1 per cent. last year. The working expenses have not changed greatly since 1881, and almost the whole decrease in gross earnings has been loss to the lessee.

Meanwhile the lines worked by the Pittsburgh, Cincinnati & St. Louis Co., including its own road and numerous branches, amounting to 592 miles, have had:

Year.	Gross earnings	Expenses	Net earnings	Rentals, int., etc.	Surplus or deficit.



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traffic in ore, coal and iron affect the northern system very much more than the southern.

Besides these roads there are three other important and one little one counted a part of the Pennsylvania's western system, it owning a large part of their stocks or bonds. These are the Chicago, St. Louis & Pittsburgh, the Grand Rapids & Indiana, the Vandalia Line and the little East St. Louis & Carondelet, having 1,230 miles in all. These have had for four years :

Year.	Gross earnings.	Net earnings.	Bental. int., etc.	Surplus or deficit.
1885.....	\$3,452,255	\$1,948,356	\$1,903,213	Surp. \$45,115
1884.....	8,481,896	6,505,307	2,086,805	Deficit 17,181
1883.....	9,934,563	7,804,905	2,073,698	Deficit 18,185
1882.....	6,641,712	7,697,559	1,947,163	1,900,935 Surp.

The earnings and expenses of these roads were nearly the same last year as the year before, and the improvement of \$215,000 in the net result is due mostly to smaller fixed charges. The decrease in earnings and expenses since 1883 has been large, but neither surplus nor deficit has ever been large.

Thus the serious decline in the income of the Pennsylvania Railroad Company is found to be almost entirely on two of its divisions, the 2,248 miles of the Pennsylvania Railroad Division, between Philadelphia and Pittsburgh, and the 1,370 miles worked by the "Pennsylvania Company," including the lines from Pittsburgh to Erie, Cleveland and Chicago, these being the lines which have the chief part of the through traffic and also the coal and iron traffic. The maintenance of through rates and activity in the iron industry will very greatly benefit these lines. That such recovery as there has been already has not been sufficient to restore the old prosperity, however, may be seen by the fact that the profits of the whole system last January were the smallest since 1878. There is to be expected, moreover, some new diversion of traffic this year, as by July the Baltimore & Ohio will have a line of its own, not only from Philadelphia to the West, but what is probably more important from Philadelphia to Pittsburgh. The traffic (aside from the through traffic to and from places further west) between these two cities is very large, and yields a very important part of the Pennsylvania Railroad's profit. The Baltimore & Ohio's line will be so long that it must compete for passengers at a considerable disadvantage; but it will probably get a large part of the freight or spoil the rates on nearly all of it.

#### NORTHWESTERN GRAIN RECEIPTS.

The great improvement in the business of the country after 1877 was accompanied by and was generally recognized as, to a considerable extent, caused by a great increase in the production, shipment and export of grain, and of provisions which were themselves chiefly made with grain. In the country west of Pennsylvania and north of the Ohio, and in that west of the Mississippi, where there had been an enormous increase of the railroad system from 1863 to 1873, grain production increased somewhat later, but in 1877 the increase was marked, and with a great foreign demand had much to do with restoring prosperity. Four consecutive good harvests, from 1877 to 1880, inclusive, with a constantly increasing acreage, gave us a great surplus to export, and the increase in this was something unexampled in the history of trade. The gold value of our grain and flour exports increased from \$38,000,000 in the year to June 30, 1869, to \$127,600,000 in 1873-74, but fell to \$107,000,000 in 1876-77, jumped to \$176,000,000 the next year, and reached the maximum of \$283,600,000 in 1879-80. The exports of the five years ending June 30, 1873, were worth \$26 millions gold, or 65 millions per year; those of the four years to the middle of 1877 amounted to 444 millions, or 111 per year; while those of the next four years amounted to 934 millions, or 233½ per year. No doubt this helped to make the good times of 1880 and thereabout, which people have been longing for ever since. Now that there has been apparently an arrest to the downward course of business, and that we are hoping for another period of prosperity, it is natural to inquire whether we are getting any help from the grain trade, which we first get trace of in the receipts of the Northwestern markets, from which in the reports are excluded those which, like Kansas City and Minneapolis, send their grain for the most part through one of the seven markets whose receipts are given below, in millions of bushels, for the last ten years:

Year.	Chi- cago	Mil- waukee	To- ledo	De- troit	St. Louis	Pe- oria	Dul- uth	Total
1876.....	84.4	23.1	28.1	7.0	28.8	13.7	1.4	186.6
1877.....	82.3	24.5	26.7	7.9	24.3	9.8	1.4	176.3
1878.....	120.4	27.9	40.1	12.9	28.4	15.0	1.9	246.6
1879....	124.5	26.4	42.0	13.1	35.0	18.5	3.4	263.8
1880.....	151.4	19.1	55.4	11.1	51.9	24.1	5.0	318.0
1881.....	128.1	18.6	29.1	7.7	43.7	26.7	3.6	257.5
1882.....	118.0	17.6	24.9	9.7	45.7	21.1	4.3	231.3
1883.....	145.4	21.9	39.5	11.0	44.8	24.2	6.8	293.6
1884.....	131.2	19.4	22.9	11.0	40.0	24.2	13.6	263.2
1885.....	125.3	16.5	12.2	12.7	44.6	24.1	14.5	249.9

The total Northwestern grain receipts (excluding flour) were thus smaller last year than in any other since 1878 except 1882, and nearly as little as in 1878. They were, however, but 5 per cent. less than in 1884 and 1879, and but 3 per cent. less than 1881. The large declines are 21 per cent. from 1880 and 15 per cent. from 1883. The flour receipts have increased immensely since 1880, and the total movement of grain and flour to the Northwestern markets have kept up much better than the above figures indicate, having been, in millions of bushels:

1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
200.5	195.0	257.3	287.4	306.9	311.3	287.5	318.0	310.9	293.4

The figures for the last two years are not quite accurate and are probably a few millions too large.

It is the distribution of the receipts which chiefly interests us. We see that of the increase from 1876 to 1880, amounting to 132 million bushels, Chicago obtained no less than 67 millions, or more than half. The increase in production during that period was not chiefly in the more western states, but very largely in the Ohio Valley—in Ohio, Indiana and Illinois; but also largely in Iowa, Kansas, Missouri and Nebraska—though the total production of Nebraska had not yet become important. Chicago receives largely from all these states west of Indiana.

In this time Milwaukee did not gain, but lost, but Toledo nearly doubled its receipts, and there was a very large increase also at St. Louis and Detroit, indicating that the increased grain receipts came mostly from the country south of the latitude of Chicago. The percentages of increase from 1876 to 1880 were:

Chicago.	Toledo.	Detroit.	St. Louis.	Peoria.	Duluth.
80	97	59	80	78	257

while there was a decrease of 18 per cent. at Milwaukee. Though the Duluth receipts had increased at a rapid rate, they remained insignificant in 1880.

Since 1880 there has been a decrease of 68 millions in the Northwestern grain receipts, of which Chicago has lost 26 millions, Milwaukee 2½, Toledo 43 millions, and St. Louis 7 millions, while Detroit and Peoria remain without gain or loss, and Duluth has gained 8½ millions.

The enormous decrease at Toledo is the most notable fact shown here. It received 78 per cent. less last year than in 1880, while Chicago's receipts fell off but 16½ per cent.

One cause of this probably is the decrease in the exportable surplus of the states of Ohio, Indiana and Illinois, from which the Toledo receipts chiefly came in 1880. These states have at once increased their consumption and decreased their production, and so much so in one of the chief grains, wheat, that it is doubtful if they have any to spare from last year's crop. This great change is not generally recognized. To show it we give the wheat production of the older winter wheat states in 1876, 1880 and 1885, in millions of bushels:

Ohio.	Mich.	Ind.	Ill.	Nev.	Total.	
1876.....	21.8	15.2	20.0	23.4	15.2	95.8
1880.....	49.8	33.2	49.8	61.0	29.6	223.4
1885.....	20.6	31.3	26.7	10.7	11.3	100.6

Thus these old wheat states, after having increased their production 128 million bushels (133 per cent.) from 1876 to 1880, have reduced it since 1880 by nearly as much, namely, 123 millions. It is true that the greater part of the reduction is due to the wretched out-turn of the last crop; but the yield was unusually good in 1884, and then the wheat crop of these states was 164½ millions, which is 59 millions, or 26 per cent., less than in 1880. Much the larger part of the wheat crop is marketed in the year in which it is harvested. If it is held over, it is mostly at Western or Atlantic elevators. Now the amount which can be marketed is reduced by the whole amount of the decrease in the crop, and more, because the population and the home consumption are all the time increasing.

This, however, is but one of the grains. The other one which makes a considerable figure in the grain movement is corn. But even the production of this in these older states decreased from 854 millions in 1879 to 781 in 1884, so that there was reason for a decrease in the grain receipts at the markets which are supplied from these states.

But perhaps the decrease in the reported Toledo receipts is due to a greater extent to the fact that the grain which formerly went into elevators there and was forwarded largely by lake, now for the most part goes through it by rail without stopping, and so is not reported.

The country further north and west is that which has had an increase in grain production since 1880, but not the whole of this; for neither Iowa, Wisconsin nor Minnesota produced as much wheat in 1885 as in 1880, their aggregates being:

Wheat.	Corn.	Oats.
1880.....	90.2	324.1
1885.....	80.3	302.4

The increase in oats but little more than makes good the decrease in corn in feeding value, so that we may

say that these three old spring wheat states have not increased their grain production since 1880, though 1885 was not particularly unfavorable for spring wheat.

Thus we must go to the border to find anywhere an increase in grain production. Here in Kansas, Nebraska and Dakota it has been:

Kansas.	Nebraska.	Dakota.	Total.
1885.....	1880.	1885.	1880.
Wheat.	20.3	19.8	27.9
1885.....	1880.	1885.	1880.
Oats.	8.6	24.0	5.3
1885.....	1880.	1885.	1880.
Corn.	105.7	122.1	64.3
1885.....	1880.	1885.	1880.
Total.	206.8	134.6	83.6
		55.1	9.0
		427.8	227.2

Here we find an increase of 62 millions of wheat since 1880, against the decrease of 133 millions in the older states; and an increase of 82 millions in corn, against a decrease of 85 millions in the older states west of Pennsylvania. Bearing in mind the great increase in population in some of these states, and especially of some of their cities, we have a reason why the quantity sent to the Northwestern markets should have decreased, and why it should have decreased more at Toledo than elsewhere. The production of Kansas is marketed chiefly at St. Louis and Chicago, the production of Nebraska at Chicago, the production of Minnesota and Dakota at Chicago, Milwaukee and Duluth, and as the increase in production since 1880 has been chiefly in the northern parts of Minnesota and Dakota, production decreasing materially in Southern Minnesota, its nearest markets are Minneapolis and Duluth. From Minneapolis little goes except in the shape of flour, so that from the increase in production in this newest part of the West neither Chicago nor Milwaukee grain receipts are likely to be much affected, though their flour receipts are immensely. The wheat crop of Kansas was extraordinarily light in 1885, and that of Nebraska below its average, so that the progress of these two states is not fairly represented by their production last year. We shall see that best by comparing the acres of the three grains, which were:

1885.....	Kansas.	Nebraska.	Dakota.	The three.
1885.....	6,708,720	5,941,775	3,069,984	15,650,479
1879.....	5,715,079	3,350,982	434,376	9,500,437
Increase.....	1,083,641	2,630,793	2,635,008	6,350,047
Per cent.....	19.0	78.5	606.8	66.8

This being unaffected by accidents of the seasons, tells what progress has been made in the border states towards bringing the land under cultivation, an increase of nearly one-fifth in Kansas, of more than three-fourths in Nebraska, while Dakota has seven times as much land in crops as in 1879—an increase of two-thirds in the aggregate of the three. The increase of 78½ per cent. in Nebraska is nearly the same in amount as the increase of 697 per cent. in Dakota, a fact worth bearing in mind, as there has not been much talk about the growth of Nebraska and a great deal about the growth of Dakota.

But this addition of 6½ millions to the acreage under cultivation, besides what there may have been in the older Western states (which has not been great) has not, we see, increased the amount of grain sent to the Northwestern markets, which again recalls the fact that the growth of population has been so much greater than the increase in production, that the quantities sent to the great markets no longer have the importance they formerly had as a criterion of the business of the country, or even of the Northwest. It is consuming its grain to a much greater extent than formerly, and the movement from the places of production to innumerable interior consuming points of which we have no records has become of great importance. In fact, the West is becoming an old country, with a great development of local traffic, which more and more overshadows in importance the through traffic, and in some articles tends to reduce the amount of the latter.

If we compare the receipts in 1885 with those of 1876, we find an increase in the total at the seven markets amounting to 63 million bushels; Chicago has gained 41 millions, St. Louis 16, Duluth 12, Peoria 10, and Detroit 6 millions, while Toledo has lost 16 and Milwaukee 6½ millions.

In this time the reduction of rail rates has worked in favor of places which are not lake ports, and consequently in favor of scores of small places which do not report at all. But both 1876 and 1885 were years of great railroad wars and low rail rates, and it is questionable whether as much grain was diverted from the water route last year by low rates as in 1876, when water rates were materially higher than last year. At Chicago, the chief of the lake ports, the receipts have increased nearly 50 per cent. since 1876, at St. Louis 52, and at Peoria 77 per cent. Their position as lake ports probably has little effect on the receipts of Toledo and Detroit now, as rail rates are so low that it is hardly worth while to transfer for the short voyage to Buffalo, and this may have had a considerable effect in reducing the Toledo receipts.

The changes in the relative positions of the different

markets' is best shown by the percentages of the total Northwestern receipts going to each in the different years, as follows:

Year.	Chi. cago.	Mil. waukee.	To. ledo.	D. etroit.	St. Louis.	Pe. oria.	Du. luth.	Total.
1876...	45.2	12.3	15.1	3.8	15.4	7.5	0.7	100.0
1877...	46.5	13.9	15.1	4.5	13.7	5.5	0.8	100.0
1878...	48.8	11.3	16.3	5.2	11.5	6.1	0.8	100.0
1879...	47.2	10.0	15.9	5.0	13.6	7.0	1.3	100.0
1880...	47.6	6.0	17.4	3.5	16.3	7.6	1.6	100.0
1881...	49.8	7.2	11.3	3.0	16.9	10.4	1.4	100.0
1882?	46.7	7.6	10.8	4.2	19.7	9.1	1.9	100.0
1883...	49.5	7.5	13.5	3.7	15.3	8.2	2.3	100.0
1884...	49.8*	7.4	8.7	4.2	15.6	9.2	5.1	100.0
1885...	50.1	6.6	4.9	5.1	17.9	9.6	5.8	100.0

Thus Chicago had a larger proportion of the receipts last year than in any other, and in the last three years than in any other three, and this in spite of the rise of Duluth as an important market, taking grain chiefly from a newly developed country. St. Louis, the market next in importance, had a larger share last year than in any other except 1882, but not a much larger share than in 1880 and 1881. Peoria had little more than the average of the last five years, but considerably more than in any of the previous five years. Duluth has gained steadily, but chiefly in the last three years. Detroit was nearly up to its maximum last year, while Toledo has not one-third of the share which it had in the first four years in the table, and less last year than in any other, and Milwaukee had a smaller share last year than in any other except 1880, and a much smaller one than before 1880. Chicago, St. Louis and Duluth are the markets which gain, the three together receiving 73.8 per cent. of the whole last year, against 70.5 in 1884, and 67 to 68 since 1880.

There is not now a prospect of a very large increase in production in any of the country which supplies these markets, except Dakota, and its production is chiefly wheat, which does not make large figures, compared with corn. But the larger part of the Dakota wheat is likely to go to Duluth or to the Minneapolis mills to be ground. Kansas and Nebraska, it is true, have not ceased growing, but they are not likely to grow so fast as heretofore, and there are as yet no indications that the Northwest as a whole is preparing to increase production any faster than the growth of its own consumption. We cannot expect, therefore, in the next few years any such great growth in the Northwestern grain receipts as there was from 1877 to 1880.

#### THE PROS AND CONS OF THE COUPLER TYPES.

Granting that the conclusion reached in our issue of Jan. 29 last, "Coupling in a Vertical Plane," is a true one, that the existence of two diverse types of automatic freight car-couplers, each of which has been skillfully embodied in devices which have met with favor, is certainly the first and most important obstacle to some practical decision of the coupler question, and probably the only one of serious moment impeding an early decision, it becomes of interest, as we then said, "to consider in an entirely unbiased and (so far as is possible) strictly impartial manner, what are the mechanical merits of the two types of couplers, not in the abstract, but under all the circumstances of the existing situation," especially as neither of the types can be rationally claimed to have all the arguments on its side, or even a very heavy preponderance, so that disinterested men, who desire only the public good in the matter, would for the most part think it a fortunate circumstance if either one of the types were sunk in the sea and forgotten, leaving the field clear for the other."

This question, as we pointed out, has not been really acted on by the Master Car Builders' Association, for the subsequent course of that body, if nothing else, makes it plain that the resolution passed by it to the effect that "the best coupler mechanically is one which performs the coupling along a vertical plane," was not passed with the intention that "the best mechanically" should be interpreted as the equivalent of "the best practically," since, in all its later and more carefully considered action, exact impartiality to the two opposing types has been shown. The resolution, moreover, was passed after too brief discussion, and with too plain a misunderstanding of its purport on the part of some of those present, to make it fair to opposing interests to regard it as in any sense committing that association as a body to the view that either type of coupler was, in a practical sense, the best one to adopt.

The various requirements of the best practical coupler may be summarized as follows, mentioning them in about the reverse order of their importance.

1. That it shall be cheap;
2. That it shall be light;
3. That it shall be durable;
4. That it shall never fail to couple either on curves or tangents, on good track or bad track;
5. That the car shall be reversible (*i. e.*, work equally well if the car be turned end for end—a condition

which is of course vital, but which is not infringed by any prominent coupler);

6. That it shall dispense with loose or surplus parts;
7. That it shall couple with draw-heads of different level (within the practical limits of variation in cars in regular service) and admit of up and down motion of each draw-bar, when coupled;

8th. That it shall admit of leaving slack if it proves desirable, or have some equivalent in the shape of easier springs;

9. That it shall not require slack to the extent of constituting an obstacle to the safe and efficient use of train brakes of any approved type which may be adopted;

10. That it shall be strong;

11. That it shall never uncouple of itself;

12. That it shall couple automatically with as many other automatic couplers of its own type as possible, and

13. That it shall couple readily with draw-heads of common type, with the least possible danger to employés.

In this baker's dozen of requirements we have about every point which a perfect coupler should have, or if not, it will not be disputed that the type of coupler which, on an average, fulfills these conditions most perfectly is the best type for adoption in a practical sense, however it may be theoretically. Neither will it be disputed that it is both reasonable and necessary to assume that the theoretical capabilities of each type have by this time been pretty thoroughly developed by the process of natural selection, to the extent at least that it would be somewhat worse than idle to assume that anything materially different from, or better than, what has actually been attained with each type is practically possible.

The two first questions, cheapness and lightness, are one of fact, and as the facts in this respect are known or accessible to all, it would be profitless to discuss them. Definite data on this head are not readily accessible, but although such difference as exists may very probably have undue influence, it will not be disputed that it is not large enough in favor of either type to be justly entitled to rank as more than a very subordinate question.

The same is true, we imagine, as respects durability. Any marked difference in durability would be of decisive importance, but experience seems to have shown that the best examples of each type are sufficiently durable to reduce any probable difference in this respect to a slight percentage on the cost of maintenance and renewal, without any noticeable difference in the probability of dangerous fracture in service.

On the fourth point, certainty of coupling, far too much stress has been laid. About the only probable disadvantage from the introduction of automatic couplers is that the banging and thumping of freight cars, already conspicuous enough with the safety of a man standing between them to be considered, will grow worse and worse, increasing the breakage and wear and tear, and even in some cases, danger to human life. If uncertainty of coupling under such treatment would serve to prevent it, it might plausibly be claimed to be a positive advantage. As a matter of fact, however, all the twelve couplers recommended at Buffalo (six of each type) coupled equally well either slow or fast on straight line, and only one (Hein, vertical plane) failed in violent coupling on a 20 degree curve, with one draw-bar elevated 3 in. above the other. On the other hand, another of those recommended (Dowling, vertical plane) failed in slow coupling on the curve mentioned. Both these failures may well have been due to remediable defects, and that the committee thought so is evident from the fact that they recommended them for further trial. Out of the whole 42 couplers tried, including several in each type of the crudest kind, there were only these failures (not all having been subjected to each test):

	Vertical plane.—		Link—	
	Fast.	Slow.	Fast.	Slow.
Failed on curve.....	4	3	2	2
" tangent.....	2	0	1	1
Total failures.....	6	3	3	3
Coupled on curve.....	15	15	9	10
" tangent.....	16	17	17	18
Total succeeded.....	31	32	28	28

There is no difference here worth speaking of, nor is there in the certainty with which the couplers may be set not to couple, only one or two of the less known of each type having failed in the latter tests. In the fifth and sixth requirements (that the car shall be reversible and the coupler without loose or surplus parts) we come to the chief, and what is in fact the only, ground for the declaration of abstract principle made by the Master Car-Builders' Association, to the effect that (th

resolution was never reduced to formal wording so that it can be quoted in the ordinary form) "the best coupler, mechanically, is one which performs the coupling along a vertical plane." No one of the other details, not even the seventh (admissible variations of level in draw-bars) can by any possibility be fairly included



Fig. 1.

in a declaration of inherent mechanical superiority of one type over another. Let us not be misunderstood: It is always in order for any man or men to declare that a certain coupler or couplers of either type are in fact better in any one or all of the points of a good coupler than any or all existing couplers of other types known to him. We may then question his judgment, or may not, but it is not pertinent to question it on the ground that it is palpably impossible or involves a confusion of terms. It is merely a

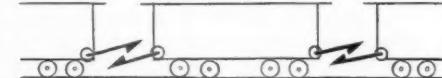


Fig. 2.

question of fact, to be settled by examining the facts, and may well be established by showing that of the particular couplers compared this or that one is in fact the best, even if an extension of the comparison would reverse the decision. But when we come to what is in effect a declaration that of all possible couplers which ever have been, are now, or ever will be invented, those will be mechanically the best "which perform the act of coupling along a vertical plane," it is very different matter. We then have a declaration of principle to the effect that, let inventive genius do what it will, couplers of a certain type have a certain advantage which all couplers whatsoever of the other type not only have not, but cannot obtain. This is a very large-sized declaration. Unless it covers some

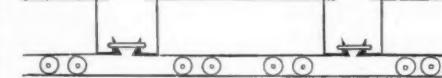


Fig. 3.

material point of vantage it is a rather worse than useless declaration, and if it does cover some material point, it is or ought to be practically decisive of the controversy. It has a certain rash sound, as seeming to imply a species of omniscience, and yet it does not, for any body of men of ordinary intelligence might pass a resolution, for example, that "the best wheel, mechanically, is one which is circular rather than polygonal," with as much practical certainty as if they were in fact omniscient. But it certainly requires a clear, unmistakable and palpably ineradicable disadvantage in the condemned type to justify such a resolution.

Such a clear and ineradicable disadvantage of the link type as compared with the vertical plane we find, as stated in the points 5 and 6 above, and nowhere else (although it is sometimes incorrectly assumed that figs. 10 and 11 outline another ineradicable defect of the link type), so that it is important to see just what there is in this difference and wherein it lies.

In figs. 1, 2 and 3 we have in a nutshell the reason why it is perfectly true to say that "the best coupler,



Fig. 4.

mechanically, is one which couples in a vertical plane," i. e., moves in coupling in a horizontal plane. Fig. 1 is a type of all vertical-plane couplers—two hooks engage into each other laterally, and are then kept from separating by any device, not shown. The hooks may either swing around some pivot *a* *a'*, as in the Miller passenger coupler, and be pressed together by springs, or the hook *b* itself may be pivoted on the draw-bar and be prevented from disengaging by some positive catch, as in the Janney passenger and freight coupler, shown in outline in fig. 6. Wherever the pivot may be, the essential element of the type is the same, and it is apparent in fig. 1 that only one moveable part of each coupler is necessary, and that of

any two which are coupling only one need actually move, while there is only one bearing surface to the complete coupling. In fig. 6, if either one of the hooks *b* be swung out open, the coupling is completed by a kind of rack-and-pinion-like movement of the open hook, while the two shanks are, except for the springs, mere rigid prolongations of the body of the car. All the more prominent couplers of this type have in substance the same movement.

The same simplicity of type would be equally pos-

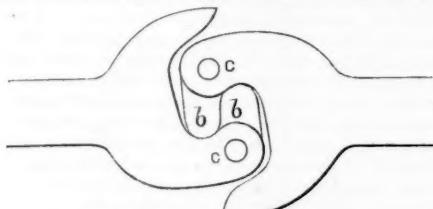


Fig. 6 (Janney.)

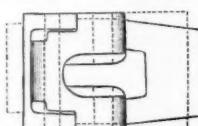


Fig. 7.

sible in couplers moving up and down instead of side-wise, as outlined in fig. 2 (for example, turn the two couplers in fig. 6 up sideways, so that it is a side view instead of a top view, and its efficiency is not affected) except for one irremediable difficulty: Cars do not always run the same end to. Turn the middle car in fig. 1 end for end, and no harm is done. The same parts will still be ready to perform the coupling in the

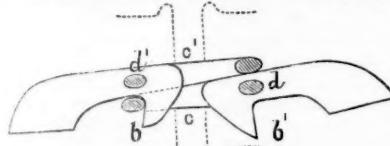


Fig. 8 (Ames.)

same way. Turn the car in fig. 2 end for end, and the possibility of coupling is destroyed. Both hooks point up at one end of the car and both hooks point down at the other. If we could reverse the middle car in fig. 2 by turning it upside down, this would not be the case, but unfortunately we cannot.

There is, therefore, no resource but to make both



Fig. 9.

ends of the car similar and use some form of independent connection, as is done in fig. 3, which is the type of every form of link or non-vertical plane coupler, automatic or non-automatic, which has or (it would seem) can be devised. The hook may be, as in ordinary couplings it is, a pin. The link may be an arrow-headed bar, but in every case there must be a loose, movable part hinging at each end to the fixed parts of the car, so that a double hinge instead of a single hinge connects the cars.

In all the thousands of patent couplers of the link type the great majority use the loose link connection outlined in fig. 2, as do five out of the six couplers of the link type recommended at Buffalo. The great disadvantage of loose links and pins, however, so readily lost or stolen, has been one of the minor evils to be

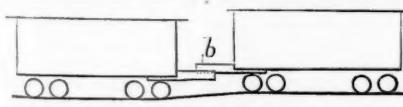


Fig. 10.

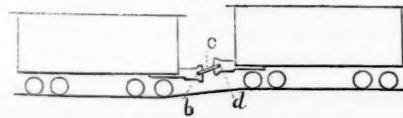


Fig. 11.

escaped from, and this has led a few of the link-coupler patentees to combine a fixed link with a hook, as in fig. 4. This being of necessity the same at each end of the car, the two links, in coupling, should simply butt against each other, but in practice one will override the other, giving the complete coupling, fig. 5. A projecting bar-hook has in some few cases been substituted for the projecting link-hook, as in fig. 9 (Hilliard), but this makes no essential difference of principle.

In fig. 8 is outlined to the same scale as figs. 6 and 7

(Janney) one of the more prominent practical embodiments of the type outlined in fig. 5 (Ames). Each has several rivals which closely resemble it in essential outline. By comparing them the theoretical advantage of the vertical plane type on which we have been commenting is well brought out, so as to be undeniable. In fig. 6 there is but one hinge-point and rubbing surface between the cars, that between *b b*. There are no surplus parts which are sometimes in use and sometimes not, but every part, in the act of coupling, does the same work in the same way at the same time. In fig. 8, on the contrary, there are two hinge-points and rubbing surfaces, the pin *d* and the hook *b*, connected by the link *c*, to which may likewise be added the pin *d'*. There is also the surplus or duplicate link *c'* and the hook *b'* which have nothing whatever to do, and yet which must be added as the only way to overcome what we have seen is the ineradicable defect of the type. Every one having the mechanical sense at all developed must admire the mechanical neatness and simplicity of the type shown in fig. 6, and must admit that "the best coupler, mechanically," is one of that type, in that sense at least.

But when this has been admitted what does it all amount to? Does it mean that the best coupler mechanically is also the best practically? In other words, is there in the two engravings 6 and 8, which represent to the same scale the elements of accredited mechanical designs for each type, such a difference that a man seeking for the best coupler can fairly say of either, "This type must certainly give the best results. Its fundamental mechanical advantages are such that, taking in view cost, durability, safety, practical convenience, certainty in coupling, in uncoupling and in not uncoupling and what not, it is the only one worth considering?" Would a man even be justified in saying that probably it was the only one worth considering on the ground that its essential mechanical advantages in themselves gave it a great advantage?

No doubt there are some who can honestly answer in the affirmative. The fairer and the wiser view, and that which appears to be generally taken, is that comparative advantages are a question of *fact* to be determined only by comparing the results actually obtained in practice.

#### Electric Propulsion on the Elevated Railroad.

The *Electrical Engineer* contains a long and interesting article on "Electric Propulsion on the Elevated Railroad." The author, Mr. Frank J. Sprague, has evidently taken considerable pains to ascertain the amount of work actually performed by the existing locomotives. Unlike some earlier and unduly enthusiastic electricians, he recognizes fully that the task of starting and stopping trains at short intervals entails very severe work upon whatever motor may be employed. Mr. Sprague's investigations show that the locomotives on the elevated railroads are not such extravagant coal burners as some electricians would have us believe, and this result coincides closely with the views expressed by us in an article written solely by the light of general experience and without the aid of any direct experiments on the elevated railroads.\*

Mr. Sprague says that indicator diagrams show the average pressure in the cylinders of the locomotives working the Third avenue trains is no less than 100 lbs. per square inch, the tractive force being 4,600 lbs., and that each engine exerts 184 gross indicated horse-power. This appears to be based on the work done while steam is on during commission hours, when the work is heaviest, and may therefore represent the maximum work performed on the elevated railroads. Our calculations were based on the average work done during the twenty-four hours on the Sixth avenue road, where the trains and grades are lighter, and agree very closely with Mr. Sprague's figures under similar conditions, being 83 and 73 indicated horse-power respectively. We agree, moreover, very closely in the amount of coal burnt per indicated horse-power per hour, Mr. Sprague giving the average expenditure at 6 lbs., and under the best conditions about 5 lbs. Deducting the steam consumed in applying the brakes and heating the cars, we estimated the consumption of fuel at between 4 lbs. and 5 lbs. per indicated horse-power per hour. Some writers on the subject have stated the consumption at 28 lbs. per indicated horse-power per hour, while Mr. Whiteside Rue was confident that these engines exerted only 22 indicated horse-power and consumed 23 lbs. of coal per hour to each horse power exerted.†

It is gratifying therefore to find that electricians, as represented by Mr. Sprague, have taken the trouble to investigate more exactly the task before them, and have arrived at actual results agreeing very closely

\*See *Railroad Gazette*, March 21, 1884.

†See *Railroad Gazette*, April 18, 1884, pages 291-292.

with our estimates. The first step in any invention is to know what has to be accomplished. Until this is done, the best means of attaining the end must evidently remain a matter of doubt.

Mr. Sprague's proposal is, briefly, to fit each car with a self-contained motor, actuated by stationary engines and dynamos at a convenient point on the line, and to utilize the energy of the train under headway by a novel species of electric brake. In all the present systems of brakes with which we are acquainted, the train is arrested by means of friction, the stored up energy of the train in motion being destroyed and performing no useful work, but simply grinding away and heating the brake shoes and tires. Mr. Sprague proposes to make the motion of the train drive some species of electric machine which will generate electricity and retard the train simultaneously. If the details of this scheme can be worked out in practical shape, electric propulsion for the elevated railroads has made an immense step in advance. The power required to start the train will not be wholly lost, as at present, by the application of the brakes, but will be stored up again ready to assist at the next start from a station. This would no doubt effect a considerable economy of power, and if it can be made to work with almost absolute regularity and certainty, will possibly solve the problem. These latter conditions are, however, essential. A few minutes' delay on the elevated railroads is of more serious consequence than one hour's stoppage on an ordinary line.

The leading bridge manufacturers and engineers and the civil engineers of many of the large railroad companies are to hold a conference at the Monongahela House, Pittsburgh, March 16, to discuss the requirements and conditions which bridges should fulfill, and if possible to adopt standard tests, methods of inspection and specifications. It is desired to arrive at some general agreement as to the exact definition and meaning of many somewhat vague phrases now used in specifications. It is believed this would save a great deal of the delay and uncertainty which at present enhance the price of bridges, to the ultimate loss of the bridge user. We understand that the bridge manufacturers have prepared, and will submit for discussion, a draft of the provisions which they suggest should be incorporated in future specifications, in order to reduce the cost of the structural work to a minimum, while retaining the fullest strength and excellence of workmanship.

The total values of merchandise exports and imports in January last have been reported by the Bureau of Statistics, by which it appears that the exports were \$22,573,000 (28 per cent.) less, and the imports \$5,177,000 more than last year, and the excess of exports over imports, which was \$38,311,000 last year, fell to \$10,561,000 this year. For seven successive years the values of exports and imports in January and the excess of the exports have been, in millions of dollars:

	1880.	1881.	1882.	1883.	1884.	1885.	1886.
Exports.....	67.0	74.1	64.9	80.4	74.0	80.5	58.0
Imports.....	55.2	45.3	57.0	57.0	54.3	42.2	47.4
Excess exps.	11.8	28.8	7.0	23.4	19.7	38.3	10.6

Thus the values of the exports were less this year than in any other of the seven, but the imports also were less than in any other except last year and 1881, and though the excess of exports is less this year than in any other except 1882, it is but little less than in 1880, which was the most prosperous year since the war. Last year this surplus was extraordinarily large. The average for the five years previous was 18.3 millions, but in 1885 it was 20 millions more, so a comparison with last year alone exaggerates the unfavorable result this year.

We gave two weeks ago the aggregate values of the grain, provisions, cotton and petroleum exports in January, which have been for three years.

	1884.	1885.	1886.
\$56,492,923	\$61,180,710	\$42,810,927	

Subtracting these from the values of the total exports, given above, we have as the value of all the other exports:

	1884.	1885.	1886.
\$17,490,684	\$19,351,874	\$15,148,635	
Bradshtuffs.....	22.1	Lumber.....	3.1
Animals and their products.....	17.1	Total.....	\$1.6
Mineral oils.....	6.9		

In addition to this 6 per cent. more of the exports

were the following products of the soil or mines, including some elaborated by some comparatively simple manufacture, namely, copper, coal, fish, furs, naval stores, oil-cake, fruits, seeds, spirits and hops, making with the above great staples more than seven-eights of the total exports.

#### Numerous New Steel Works.

The *Bulletin* of the American Iron & Steel Association of Feb. 10 gives an account of all the Bessemer works in the United States, by which it appears that they have increased in numbers considerably during the past few years of extremely low prices and slack demand, which indicates that there was confidence that the business was or would soon become profitable. It is to be said, however, that the new works are nearly all intended to make steel for other purposes than rails, and are chiefly of small capacity, and often intended for special purposes. Only one mill begun since 1882 is intended to make rails; but the following works for other purposes have been opened:

	Con-	First	Pur-	
Pittsburgh Steel Casting Co.	verters.	blow	pose.	
Bellare (O.) Nail Works.	1 5-ton	1881	General	
Riverside (Wh-eling) Iron	2 4-ton	18	Nail plate.	
Works	4		" "	
Otis Iron & Steel Co. (Cleve-	2 5-ton	1884	" "	
land)				
Oliver Bros. & Phillips (Pitts-	1 5-ton	1884	Wire rods.	
burgh)				
Western Nail Co. (B. Heville,	*2 2-ton	1884	Special.	
Ill.)				
Trenton (N. J.) Iron Co.	*1 2-ton	1886	Nail plate.	
Penn.				

\* Clapp-Griffiths plant. + Gordon converter.

Besides these, the *Bulletin* reports the following under construction and mostly near completion:

	Con-	verters.	Pur-	
Jones & Laughlin (Pittsburgh).	2 7-ton	All uses.		
Shoemaker & Co., ".	2 7-ton	Nail plate, etc.		
E. & G. Brooke Co. (Birdsboro, Pa.).	*2 3-ton	Nail plate.		
Port Henry (N. Y.) Steel & Iron Co.	*2 3-ton	Special.		
Glasgow Iron Co. (Pottsville, Pa.).	*2 3-ton	Boiler plate, etc.		
Pottsville Iron & Steel Co., "	*2 3-ton	Standard steel.		
McCormick & Co. (Harrisburg, Pa.).	*1	Plates.		
Lickdale Iron Co. (Lebanon, Pa.)	"	Plates.		
Pottstown (Pa.) Iron Co.	"	Plates.		

\* Clapp-Griffiths plant.

Here we have seven different works completed, all but one opened since 1883, and two opened since last New Year's Day, none intended to make rails, and, it may be added, all with a small capacity compared with the great rail mills, the seven together having but 36 tons of converter capacity, while the Edgar Thomson works have 30 tons (three 10-ton converters), and the new (1882) works of the North Chicago Rolling Mill Co. at South Chicago have the same. The works now under construction, so far as determined, are chiefly of the same type and small capacity, and of the entire nine only one is for rails, and that not specially for rails. The six whose capacity is given will have three 7-ton and eight 3-ton converters, adding 45 tons to the previous converter capacity—equal to 1½ times the Edgar Thomson works.

It appears from the *Bulletin's* report that the aggregate converter capacity of the completed Bessemer works in the United States is 316 tons, and the additions under way will add about 14 per cent. to this. It will, however, add immensely more to the capacity of those works producing steel for other purposes than rails, indicating that the change from iron to steel will be very great in a year or two. For it is notable that the small Bessemer plants recently constructed, or to be constructed, are nearly all for old iron works, which will probably consume most of their own product.

It is altogether probable that these numerous small works, making steel for special purposes, will succeed in making it of the special qualities best fitted for the special purposes, and of greater uniformity and homogeneity than has been required for rails, and in this way will facilitate the change from iron, which has already made so much progress. But it is probably not superior quality alone that has caused so many old iron works to put up small steel plants, but the conviction that the Bessemer metal can be produced more cheaply, pound for pound, than iron of the quality required. It has appeared that during the recent years of depression in the iron business the Bessemer works, however unsatisfactory their business may have been, have, on the whole, suffered less than the iron works, and have become profitable again much sooner. All this means that we shall probably have to learn to use steel for many purposes for which it is but little used now, and shall get powerful help in so doing, from the manufacturers who will, of course, use every effort to afford the qualities and the information concerning treatment, which will increase the demand for their wares.

#### St. Paul and Minneapolis Freight Traffic.

A report of Geo. L. Carman, Commissioner of the Northwestern Traffic Association (Chicago and Milwaukee on the east to St. Paul and Minneapolis on the west), gives the following statistics of the business of the Association for two periods, the first being the twelve months to Sept. 30, 1883, for west-bound freight, and the year to Dec. 15, 1883, for east-bound, and the second the 22 months from April 1, 1884, to Dec. 31, 1885, for freight in both directions, as follows:

	Earnings.			
	Tons.	Total	Per ton	ton-mile.
West-bound:				
12 mos. to Sept. 30, 1883	493,455	\$2,310,877	\$4.68	1.11 cts.
22 " Jan. 31, 1886	694,995	3,254,6.7	4.68	1.12 "
East-bound:				
12 mos. to Dec. 15, 1883	264,508	958,352	3.62	0.87 "
22 " Jan. 31, 1886	622,177	2,97,180	3.37	0.86 "

It appears from this that the rates were very nearly the same in both periods, and that, which is not generally known, the west-bound movement is the larger, in the earlier period there being 187 tons and in the latter period 112 west to 100 east.

The rate on the west-bound freight being the higher, the earnings from it are larger than the east-bound earnings in a still greater proportion, being in the early period \$241 and in the recent period \$155 from west-bound to \$100 from east bound freight. There is, however, no such great movement of grain or live stock from St. Paul and Minneapolis eastward as there is from Kansas City or other Missouri River points, though there are enormous flour shipments. The wheat of the country west of Minneapolis goes chiefly to Duluth if it is not ground, and some of the Minneapolis flour goes to Duluth and Washburne; but it and St. Paul also are able to get part of their surplus of merchandise from Lake Superior ports which tends to reduce the west-bound shipments also. The railroads, apparently, have succeeded in retaining most of the west-bound shipments to those places except anthracite coal, which comes chiefly by way of Lake Superior.

As one new route was recently opened between Chicago and St. Paul and two more will soon be completed, it is interesting to know what are the traffic and earnings which they will share. This will best appear by the following statement of them *per month* in each of the two periods:

Year.	West-bound.		East-bound.		
	Per month.	Tons	Earnings.	Tons	Earnings.
First period		41,121	\$182,573	23,042	\$76,863
Second period		31,591	147,937	28,281	95,326
Increase		9,530	\$44,600	6,239	\$15,463
Decrease		23.2	23.2	28.3	19.3
Per cent.					

The west-bound shipments have thus decreased one-half more than the increase in east-bound shipments, and the west-bound earnings have decreased nearly three times as much as the east-bound have increased, so that it would appear to be a reduced traffic and earnings which the three new lines are preparing to share. There was, however, considerable heavy west-bound traffic included in the first period and not in the second, namely, coal, cement, lime, salt, stone and barbed wire, which are freights most likely to go by lake and not likely to go by rail largely at rates worth accepting except at such times as the east-bound movement exceeds the west-bound, and so leaves cars to be taken west empty.

The aggregate tonnage in both directions decreased from 63,613 per month in the first period to 59,872 in the second, and the aggregate earnings from \$272,436 to \$243,263—a decrease of 5 per cent. in traffic and 11 per cent. in earnings, the best-paying traffic having decreased most. As there has been an important growth in the trade of St. Paul and Minneapolis since the first period, we may conclude that the traffic via Lake Superior ports has increased largely during the time that the traffic via Lake Michigan ports has been falling off. The whole of the latter recently appears to have been only at the rate of \$3,000,000 per year, of which probably not more than one-third is profit. When this is cut into six pieces, none of them is likely to be very large. The traffic to the country which deals with St. Paul and Minneapolis will certainly increase largely, but the increase may be much greater by the lake than by the rail routes, and the rail rates are likely to decrease, though they are low now. It is hard to see where a new line from Chicago to St. Paul will get its support, unless its resources from local traffic are several times as great as those from through business.

#### Chicago, Burlington & Quincy Earnings.

Chicago, Burlington & Quincy earnings in December were very favorable. For three years they have been:

	1883.	1884.	1885.
Passenger	\$438,631	\$302,569	\$425,578
Freight	1,547,386	1,514,078	1,693,729
Other	184,902	183,632	210,088
Total	\$2,170,918	\$2,000,299	\$2,329,975

Compared with 1884 there was a gain in everything—17½ per cent. in passenger earnings, 12 in freight and 11½ in other, making 18 per cent. in all. Compared with 1883 there was a slight decrease in passenger earnings, but a large increase in freight.

The gross and net earnings and working expenses of this road in December for the last seven years have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1879.	\$1,438,167	\$538,442	\$899,725
1880.	1,552,018	681,412	870,606
1881.	1,905,490	871,199	1,034,291
1882.	2,027,060	764,642	1,260,418
1883.	2,170,918	909,138	1,171,780
1884.	2,060,298	1,012,276	1,048,022
1885.	2,329,074	1,132,507	1,197,167

The increases over last year were:

Year.	Gross earnings.	Expenses.	Net earnings.
Amount.	\$269,676	\$116,531	\$153,145
Per cent.	13.1	11.5	14.7

For the entire year the earnings and expenses have been:

Year.	Miles.	Gross earnings.	Expenses.	Net earnings.
1880.	2,512	\$20,454,494	\$9,362,904	\$11,091,590
1881.	2,822	21,176,436	10,574,361	10,602,095
1882.	3,009	21,550,055	10,668,341	10,882,664
1883.	3,255	20,110,269	12,780,630	12,329,739
1884.	3,399	25,483,612	13,022,504	12,411,107
1885.	3,500	26,558,425	13,992,833	12,563,602

Gross and net earnings were thus larger last year than ever before, but the net earnings while slightly larger than the previous year were \$766,000 (5% per cent.) less than in 1883. The gains over 1884 were:

Year.	Gross earnings.	Expenses.	Net earnings.
Amount.	\$1,072,812	\$920,318	\$152,494
Per cent.	4.2	7.0	1.2

Thus more than five-sixths of the increase in earnings was absorbed by the increase in expenses, leaving but a small increase in net earnings—about one-fourth of the amount re-

quired for dividends the addition to the capital stock made at the beginning of the year. As, however, the company had a very large surplus in 1884, it must be said to have done positively extremely well last year, if not quite so

well, considering mileage and capital, as in some other years.

The average net earnings per mile have been:

1880.	1881.	1882.	1883.	1884.	1885.
\$4,415	\$3,754	\$3,510	\$4,005	\$3,651	\$3,590
Being less last year than in any other except 1882, but only 1½ per cent. less than in 1884.					
The earnings from different sources have been:					
Year.	Pasenger.	Freight.	Other.		
1880	\$3,534,209	\$16,054,197	\$86,089		
1881	3,616,088	16,595,819	964,550		
1882	4,756,933	15,711,519	1,082,302		
1883	5,285,839	19,513,161	1,310,369		
1884	5,339,868	18,514,431	1,629,315		
1885	5,286,408	19,565,813	1,764,184		

Thus the passenger earnings last year were a little less than in 1884, and nearly the same as in 1883, while the freight earnings were \$948,578 (5 per cent.) more than in 1884 and nearly the same as in 1883, and the miscellaneous earnings were \$74,849 (4½ per cent.) more than in 1884, and very much more than in any previous year. That the total earnings were larger last year than in 1883 was due almost entirely to the increase in these miscellaneous earnings.

Since 1882 the increase in passenger earnings has been but 12 per cent. (\$582,873), while the increase in freight earnings has

cil Bluff's business less valuable. This recently has been followed by a cut of the first-class Council Bluffs fare to the amount, about, of the commission that had been paid, which is probably more important, now that transcontinental fares are so very low, than it ever was before. An effort was made last week to agree upon a basis for the St. Paul business, the disagreement as to which is all there is in the way of maintaining the Council Bluffs rates, but it did not succeed, the Rock Island requiring that the time between Chicago and St. Paul should not be shortened without the unanimous consent of the several lines. As its line is 529 miles long, against 410 by the Milwaukee & St. Paul and the Northwestern, they might make a time so short that it would not be possible for it to equal it. They do not make very fast time now, requiring 16½ hours for the quickest train, (25 miles per hour), but the Rock Island does not attempt to keep pace with it, taking more than 20 hours for its fastest train, and it is of course at a disadvantage on this account. Should the short lines put on a train running 30 miles an hour, they would make the distance in 13½ hours, while at the same speed the Rock Island would require 17½. Now it certainly ought not to be left for a line 29 per cent. longer than its rivals to say whether they may offer the public a speed of more than 25 miles an hour. We may see the day when it will be advisable for them to run 40 miles an hour, as is done now between New York and Buffalo, a somewhat greater distance, and no long line should be permitted to stand in the way; but it can hardly be expected that with a much slower time the Rock Island will make the same price for tickets. It would seem to be a case for differential rates. The Rock Island cannot be expected to go without St. Paul passengers so long as it can get them at rates which yield the slightest profit, and it can hardly be expected to get any if charges as much as the lines which make the distance in four hours less time. When in such cases rates are nominally maintained by the long line it usually pays large commissions, and so employs a small army of men to persuade people to go by a route which they do not prefer, who almost always divide their commission with the passenger, and so demoralize business, making the result to all parties much less satisfactory than if an open difference of rates were conceded and no commissions paid.

The Chicago, Milwaukee & St. Paul has earned in February:

1882.	1883.	1884.	1885.	1886.
\$1,376,317	\$1,257,046	\$1,317,064	\$1,345,496	\$1,564,000

Thus the earnings were \$218,504 (16 per cent.) more this year than last, and more than ever before.

The Chicago & Eastern Illinois reports for February:

1882.	1883.	1884.	1885.	1886.
\$127,212	\$112,369	\$107,467	\$107,024	\$128,365

This road, too, has larger earnings this year than ever before, and 20 per cent. more than last year.

The Northern Pacific reports:

1882.	1883.	1884.	1885.	1886.
\$208,935	\$228,158	\$220,085	\$269,964	\$269,227

Thus the earnings this year were very nearly the same as last year, and larger than ever before. In January there was a considerable decrease.

The February earnings of the St. Louis & San Francisco have been:

1882.	1883.	1884.	1885.	1886.
\$240,139	\$229,411	\$322,805	\$302,663	\$302,500

being practically the same this year as last. It, too, had a considerable decrease in January.

The Central Iowa's February earnings have been:

1882.	1883.	1884.	1885.	1886.
\$96,353	\$80,387	\$89,154	\$85,992	\$100,434

This road suffered much from blockades last year in February, but its earnings this year are slightly larger than in any other, though they are very small for so long a road in so populous a country (\$205 per mile).

In all comparisons of February earnings with last year it should be remembered that the railroads west of Chicago and some of those east of it suffered much from snow last year and very little this year. This kept a large amount of Northwestern traffic back till March, when the railroads west of Chicago had exceptionally large earnings. This year the bad weather came in January, and probably caused the February earnings to be larger than they would have been otherwise.

Immigration in January is reported by the Bureau of Statistics, excluding arrivals from Canada, which are not reported. The number of arrivals is given as 8,749 this year, against 6,021 last, but last year the number of arrivals was reported to be 11,369, or nearly twice as many as the report gives now. January is always the month of lightest immigration, and even in 1882, when the arrivals for the whole year were 712,542, only 18,489 came in January. There is, however, no reason to expect a heavy immigration later in the season.

A notable example of a cheap railroad is found in the Dublin & Wrightsville Railroad in Georgia. This is a standard gauge road, recently completed from Wrightsville, Ga., to Bruton, a distance of 11½ miles. It runs through a generally level country, and a little over half of the right of way was given, though for about five miles it was necessary to buy the land. The grading was done by convict labor, for which \$1 per day per man was paid. Nearly one-third of the ties (2,640 to the mile) were cut on the right of way, and the rest were obtained close to it, their average cost being but 10 cents each. The whole cost of the road, graded and furnished with ties, ready for the rails, is reported by the Treasurer at \$11,557, or \$1,000 per mile. The company contracted with the Central Railroad Company of Georgia to lay the track (with second-hand iron rails

taken up from its main line) for \$1,800 per mile, so that the road has cost so far \$2,800 per mile. The stock subscriptions amounted to \$22,600, so that the company has about \$11,000 left to furnish equipment, and it is expected that the entire cost, including the equipment, will be under \$4,000 per mile. An extension beyond the present terminus is to be built, which will cost a little more, as several bridges will be needed.

This is a sort of neighborhood railroad, of which quite a number have been built in Georgia in the last few years. They furnish a cheap and convenient outlet for the products of the adjoining country, and have generally been built by the money of the people in the districts which they serve, their owners looking for a return in the saving in transportation of their crops rather than in the shape of dividends on their investment. These cheap roads are not by any means to be despised as feeders for the more important lines, and their construction has generally been encouraged by the older companies.

Herr Joseph Grossmann has published a little pamphlet in regard to the running warm of bearings, in which he condenses the observations of his larger work lately reviewed in these columns. Its main object is to do away with the fear of hot bearings always felt by engineers when the bearings begin to run warm.

He discriminates between dangerously warm bearings and advantageously warm ones. The former are those which keep steadily growing warmer, while in the latter the warmth alternately increases and decreases. That he is right in thinking that with most oils a warmth in bearings nearly too much for comfort to the hand is advantageous for developing their full lubricating effect can hardly be questioned. Since, however, an engineer can never know whether an increasing warmth in his bearings will go on increasing until it stops doing so, after which the danger is over, there does not seem to be much practical advantage to him in the knowledge furnished by Herr Grossmann's little book, though it may ameliorate somewhat his anxiety over warm spots and prevent his wasting time in getting rid of these before they have passed the limit of positive advantage.

#### Record of New Railroad Construction.

Information of the laying of track on new railroad lines is given in the current number of the *Railroad Gazette* as follows:

*Atlantic & Pacific*.—The *Central Division* is extended from Red Fork, Ind. Ter., west 10 miles.

*Bowden Springs*.—Completed from Salt Springs, Ga., to the Bowden Lithia Springs, 1½ miles.

*Central Pacific*.—The *Oregon Division* is extended northward to Portuguese Flat, Cal., 3 miles.

*Jacksonville, Tampa & Key West*.—The extension to Sanford, Fla., is 3 miles longer than reported last week.

*Marietta & North Georgia*.—Extended from the line of Gilmer County, Ga., northeast 4 miles.

*San Antonio & Aransas Pass*.—Extended from Floresville, Tex., southeast to Beauregard, 10 miles.

—This is a total of 31 miles on 6 lines, making in all 193 miles thus far reported for the current year. The new track reported to the corresponding date for 15 years has been:

	Miles.		Miles.	Miles.	
1886	193	1881	254	1876	252
1885	17	1880	575	1875	90
1884	213	1879	141	1874	161
1883	261	1878	204	1873	328
1882	609	1877	82	1872	204

These figures include main track only, second tracks and sidings not being counted.

#### NEW PUBLICATIONS.

*The Twelve Selected Car Couplers*.—The preface of this little pamphlet "by W. V." says that "it has been written for the purpose of giving valuable information to all those persons who have assisted the Perry car coupler enterprise and to those who are friends and well-wishers of said enterprise, and is not for public distribution."

The writer of the pamphlet asserts that the Perry coupler will prevent every accident in coupling cars. As this and every other statement in the pamphlet is doubtless equally true, the friends and well-wishers of the Perry coupler should include every railroad man, and therefore we venture to think that a some extracts from this little book will be of great interest to our readers, especially as it handles the subject in a fresh and original style without gloves, and disclaims merely to point out the good points in each coupler, but places the disadvantages of at least eleven of the chosen twelve in a strong light.

The twelve couplers are illustrated by diagrams, and subjected to a little gentle criticism, of which the following are samples:

"The Archer has no arrangement for guiding the link, but depends wholly on the weight of the hook bar for holding up the link to nearly a horizontal position, consequently when being coupled to a higher draw-bar the link must be guided by the hand. If the hook is broken off no coupling-pin can be inserted. \* \* \* It cannot be coupled to with a link held in an open draw-bar. \* \* \* If the hook gets broken it requires as a repair the entire hook-bar. The hook proper is only one-fifth as strong as a 2 in. coupling-pin having only 2 in. strain. This hook requires a special link \* \* \* in order to be able to work on curves. This coupler requires special and favorable conditions in order to do its work; i.e., the draw-bars must be of nearly the same height and of a similar kind."

This pamphlet implies that this last fault applies also to all the other couplers except the McKeen and Perry.

The Marks coupler "possesses the same faults as the Archer."

The Ames

\* Requires a dead slack of 1½ in. to uncouple. The crooked

or S link cannot be used at all with this coupler in coupling to draw-bars higher than itself. \* \* \* The timbers of all cars have to be changed to accommodate this unusually large draw-bar. \* \* \* To break this hook or the link means throwing away the whole link and hook device, and the whole draw-head must be taken back to powerful machinery to have the trunnion forced out. If the hook gets broken \* \* \* it is almost impossible to find a pin long enough to be used in its place, the draw head measuring 9 in. inside. As only a pin 1½ in. round can be used, a light load will break it."

"The Gifford is very uncertain in working automatically even under favorable circumstances, not averaging to couple more than one-third of the time. When used on a gravel train it cannot be raised automatically at all. The coupler depends upon good luck or the hand for operating successfully. It requires an 11½ in. link. A link in an open draw-bar (one that has no metal back of the link which forces the link into position) cannot force up this latch."

In the McKeen coupler

"The coupling-pin has to be held up by hand until the link is withdrawn, thereby requiring the brakeman to follow along after the car holding on to the pin until the cars are far enough apart so that the spring block is pushed under the coupling-pin—very dangerous indeed. \* \* \* This coupler in its future tussle with sleet, ice and gravel in the lower part of the draw-head will experience great trouble."

The vertical plane couplers are considered in a group thus:

"The excess in price of the vertical over the link couplers is enough to pay for more links than will average to supply one car with links for three years. The wearing out and breaking of the loose parts of the vertical will more than keep up with the loss of links. The greater trouble is in the fact that the rotating hook wears equally on the draw-bar as on itself. \* \* \* Other and greater considerations have kept and will keep the vertical from becoming the standard freight coupler. \* \* \* The rigidity of the train caused by the continual wearing and grinding against each other of the vertical planes causes a loss of at least 20 per cent. of power in hauling the train, and this increases in an increasing ratio in proportion to the length of the train. A new patent oiling device is now what is needed in connection with the grinding and frictional surfaces of the vertical plane couplers. \* \* \* The car coupling link constitutes the safety valve of a train of freight cars, \* \* \* as it will break more easily than the pulling in two of a car. If the strictly automatic car coupler is made so strong that the locomotive cannot break it, the relief point must be in the frame of the car. The strictly automatic has as yet no record as a freight coupler, though it has been used in the hauling of refrigerator and stock cars, which are obliged to be handled with greater care than even passenger cars."

The pamphlet here goes on to praise the Perry coupler, but as most of our readers are probably a little tired of hearing couplers praised by their inventors, and prefer to hear the weak points of couplers exposed, we refrain from further quotations. The writer says that he sincerely hopes that his pamphlet will be studied carefully. With a view to further this wish, we have made ample quotations, so that our readers will be able not only to study the weak points of eleven couplers, but will have an opportunity of pointing out that each of the twelve couplers, like most things in the world, possesses both faults and virtues.

#### General Railroad News.

##### MEETINGS AND ANNOUNCEMENTS.

###### Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Chicago & Alton*, annual meeting, at the office in Chicago, April 5.

*Chicago, St. Louis & Pittsburgh*, annual meeting, at the Union depot in Indianapolis, Ind., March 17.

*Illinois Central*, annual meeting, at the office in Chicago, March 10.

*Louisville, New Albany & Chicago*, annual meeting, at the office, No. 31 Nassau street in New York, March 10, at noon.

*Missouri Pacific*, annual meeting, at the office in St. Louis, at 9 a.m., on March 9. Transfer books close Feb. 6.

*Pennsylvania Railroad*, annual meeting, at Musical Fund Hall in Philadelphia, at 11 a.m., on March 9.

*St. Louis & Cairo*, special meeting, to vote on the question of leasing the road to the Mobile & Ohio, in New York, March 15.

*Union Pacific*, annual meeting, at the Meionao in Boston, at 10 a.m., on March 31.

*Wabash, St. Louis & Pacific*, annual meeting, at the office in St. Louis, March 9.

###### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Atlanta & Charlotte Air Line* (leased to Richmond & Danville), 2½ per cent., semi-annual, payable March 6.

*Boston & Albany*, 2 per cent., quarterly, payable March 31, to stockholders of record on Feb. 27.

*Chicago & Northwestern*, 1½ per cent., quarterly, payable March 24, to stockholders of record on March 9.

*Shade Gap* (leased to East Broad Top Co.), 1½ per cent., semi-annual, payable March 1.

*West Jersey*, 3 per cent., semi-annual, payable March 15, to stockholders of record on Feb. 26.

*West Jersey & Atlantic* (leased to West Jersey), 3 per cent., semi-annual, payable March 15, to stockholders of record on Feb. 26.

*General Time Convention* will hold its spring meeting at the Grand Hotel in Cincinnati on Wednesday, April 14.

The *Association of American Railroad Superintendents* will hold its next meeting in Cincinnati on Thursday, April 15.

The *American Society of Mechanical Engineers* will hold its next meeting in Chicago, on Tuesday, May 25.

The *Master Car-Builders' Club* will hold its regular monthly meetings through the winter at the rooms, No. 113 Liberty street, New York, on the evening of the third Thursday in each month.

The *New England Railroad Club* will hold its monthly

meetings at its rooms in the Boston & Albany passenger station in Boston, on the evening of the second Wednesday in each month.

The Western Railway Club will hold its regular monthly meetings at its rooms, No. 103 Adams street in Chicago, on the third Wednesday in each month.

#### Foreclosure Sales.

The Missouri & Arkansas Division of the Texas & St. Louis road was sold in St. Louis, Feb. 27, under a decree of foreclosure of mortgage, and was bought by E. J. Smith, agent of the bondholders' committee, for \$7,401,000. Mr. G. H. Tenbrook, who was understood to be the agent of some New York capitalists, bid against Mr. Smith for the property and ran the price up to \$7,400,000, when he stopped, having reached the limit allowed him.

#### Transportation in Congress.

The following is the text of the report from the House Committee on Canals in favor of an appropriation of \$20,000 for the survey of a ship canal to connect the Delaware River with the Atlantic Ocean:

"The committee have come to the conclusion that a survey of a route to connect the Delaware River and the Atlantic Ocean by a ship canal should be made in the interests of commerce. They are convinced that such a line can be found by survey and examination to be entirely feasible, and that through the Engineer Department of the Army such information can be furnished to the House of Representatives as will enable it to act intelligently upon any proposition which may hereafter be presented for the commencement of the actual work of construction."

"An examination of the topography of New Jersey shows natural waterways flowing westwardly into the Delaware River, as well as others flowing in an easterly course into the bays emptying into the Atlantic Ocean, which would greatly facilitate the construction of the canal contemplated, and that its completion would lessen the distance greatly between the Delaware and the ocean, saving on the Atlantic coast almost 50 miles of dangerous navigation and upon the Delaware bay and river to the vicinity of Camden some 95 miles. The length of the canal would not be more than 60 miles. The committee recommend an appropriation of \$20,000 for making the survey and examination, and urge the importance of having its results and the estimates of construction submitted to the House of Representatives during the present session of Congress, if practicable."

#### Switchmen's Mutual Aid Association.

The first annual convention of the Switchmen's Mutual Aid Association of Illinois convened in Chicago, Feb. 22, and continued in session during the week, with the following officers: John Drury, President; James Monaghan, Vice-President; James A. Healey, Secretary, all of Chicago; J. H. Hill, of Kansas City, Reading Clerk, and M. J. Keegan, Sergeant-at-Arms. There are delegates from several states in attendance, and a revision of the constitution and by-laws was made in order to obtain a national charter and organize a mutual life and accident association.

#### New England Railroad Club.

The annual meeting of this club will be held at its rooms in the Boston & Albany station in Boston on Wednesday, March 10, at 7:30 p. m. The Treasurer will then submit his report and officers for the ensuing year will be elected. A committee consisting of Messrs. George Richards, John Kent and John T. Chamberlain was appointed at the last meeting to present a list of officers to be voted for.

The question of entertaining the Master Mechanics during the meeting of their association in Boston next June will be considered. The question of the coming joint discussion, continued from the February meeting, will be talked over and arrangements made for the continuation of the discussion.

After the business meeting the following questions for discussion will be brought up: "Are you in favor of reducing the weight of the cars in passenger service? And is it possible to adjust the springs to light weight cars so as to give easy riding cars on a fast express train? What weight would you recommend for body, and what for trucks of the various sized cars for passenger service?"

#### ELECTIONS AND APPOINTMENTS.

*Atlantic & Pacific.*—Mr. George F. Brydon is appointed Assistant General Passenger Agent. He is now on the Ohio & Mississippi.

*Brooklyn Central Elevated.*—This company has elected officers as follows: President, Austin Corbin; Vice-President, Edward A. Abbott; Secretary and Treasurer, N. H. Frost; Executive Committee, Wm. Richardson, J. R. Maxwell and Wendell Goodwin.

*Camden & Atlantic.*—At the annual meeting in Camden, N. J., Feb. 25, the following directors were chosen: Wm. Bettle, Richard D. Barclay, James B. Dayton, Enoch A. Doughty, J. N. DuBarry, Thomas H. Dudley, Wm. L. Elkins, John B. Hay, Wm. C. Houston, Crawford Miller, Edmund E. Read, Frank Thomson, Henry D. Welsh.

*Cleveland, Columbus, Cincinnati & Indianapolis.*—At the annual meeting in Cleveland, O., March 3, the following directors (one-third of the board) were chosen: Benjamin S. Brown, Wm. Bayard Cutting, A. G. Dulman, George H. Russell.

*Connecticut Railroad Commission.*—The Governor of Connecticut has reappointed Mr. George M. Woodruff a member of the Railroad Commission for another term, and the Senate has confirmed the appointment.

*Delaware, Lackawanna & Western.*—Mr. W. F. Hallstead, for a number of years General Superintendent, has been appointed General Manager, a new office on this road.

*East St. Louis & Carondelet.*—At the annual meeting in East St. Louis, Ill., Feb. 18, the following directors were chosen: J. W. Conlogue, J. N. McCullough, W. R. McKeen, A. McNeil, Thomas D. Messier, J. S. Peers, Williamson Plant, Edgar Reynolds, Charles H. Seybt. The board elected Thomas D. Messier, President; S. B. Liggett, Secretary; John E. Davidson, Treasurer; Joseph Hill, Superintendent. The company is controlled by the Pennsylvania Company.

*East Tennessee, Virginia & Georgia.*—At the adjourned annual meeting in Knoxville, Tenn., Feb. 26, the following directors were chosen: R. H. Richards, Atlanta, Ga.; Charles M. McGhee, E. J. Sanford, Knoxville, Tenn.; Isaac H. Bailey, Calvin S. Brice, E. W. Corlies, Oliver Hoyt, E. R. W. Lyman, John J. Martin, Nelson Robinson, George I. Seney, George R. Sheldon, Samuel Shethar, A. H. Stevens, Samuel Thomas, New York. This is substantially the old board.

*Grand Rapids & Indiana.*—At the annual meeting in Grand Rapids, Mich., March 3, the old directors were elected with the exception of C. A. Zollinger, who declined further service, and was succeeded by C. T. Muhler, of Fort Wayne, Ind. The board re-elected the old officers.

*Housatonic.*—At the annual meeting in Bridgeport, Conn., Feb. 26, the following directors were chosen: Wm. H. Barnum, Lime Rock, Conn.; A. B. Mygatt, New Milford, Conn.; Wm. E. Downes, D. W. Plumb, Birmingham, Conn.; Charles K. Averill, Wm. D. Bishop, Horace Nichols, Bridgeport, Conn.; Edward Leavitt, John B. Peck, New York. The board elected Wm. H. Barnum, President; Charles K. Averill, Secretary and Treasurer.

*Kansas City, Fort Scott & Gulf.*—Mr. S. M. Hibbard is appointed General Agent in Kansas City, Mo., for this road and its controlled lines in place of F. E. Nettleton, resigned.

*Kansas City Union Depot Co.*—Mr. F. E. Nettleton has been appointed General Baggage Agent. He was recently on the Kansas City, Fort Scott & Gulf road.

*Lawrence.*—At the annual meeting in Pittsburgh, Pa., Feb. 26, directors were elected as follows: L. H. Meyer, Charles W. Cass, Charles Lanier, New York; John B. Jackson, J. N. McCullough, Pittsburgh; R. W. Cunningham, New Castle, Pa.; John N. Hutchinson, Philadelphia. The officers are L. H. Meyer, President; John J. Haley, Secretary and Treasurer.

*Lehigh & Wilkes-Barre Coal Co.*—At the annual meeting in Philadelphia, Feb. 25, the officers were elected as follows: President, Wm. H. Tillinghast; directors, John Kean, George de B. Keim, H. S. Little, George R. McKenzie, W. R. Skidmore, Benjamin Williamson.

*Little Rock, Mississippi River & Texas.*—From Feb. 28 this road is in possession of E. H. Winchester and John Reed, trustees under the first mortgage. They have appointed Mr. Henry Wood their agent to manage the property. Mr. Wood has been for some time General Manager of the road.

*Minnesota & Northwestern, of Illinois.*—The directors of this new company are: Adolphus F. Schiffman, John I. Thompson, St. Paul, Minn.; Henry A. Gardner, Wm. A. Gardner, Albert McFadden, Chicago.

*Missouri Pacific.*—Mr. W. J. Rogers has been appointed Master Mechanic in charge of the shops at Kansas City, Mo., in place of W. T. New, resigned. Mr. Samuel Weller is appointed Master Mechanic in charge of the shops at Sedalia, Mo., in place of T. W. Newell, transferred to the Missouri, Kansas & Texas Division.

*Norfolk & Western.*—The following circular from Vice-President C. G. Eddy is dated Roanoke, Va., Feb. 25: "Mr. A. Pope is appointed General Freight Agent, vice Mr. Chas. P. Hatch, resigned. Mr. W. B. Bevill is appointed General Passenger and Ticket Agent. To take effect March 1."

*St. Paul, Minneapolis & Manitoba.*—The following order from President J. J. Hill is dated St. Paul, March 1: "Mr. A. L. Mohler is appointed Land and Emigration Commissioner, vice Mr. J. B. Power, resigned, to take effect March 1, and will have charge of all business pertaining to the Land Department of the company."

*Southwest Pennsylvania.*—This company, whose road is leased to the Pennsylvania Railroad Co., elected officers as follows in Philadelphia, March 2: President, J. N. DuBarry; directors, John K. Ewing, John P. Green, Wm. J. Howard, George F. Huff, Wm. A. Patton, Robert Pitcairn, George B. Roberts, B. F. Ruff, N. Parker Shortridge, Edmund Smith, George A. Torrence, J. N. Wentling.

*Spencer.*—At the annual meeting in Spencer, Mass., March 1, the following were chosen: President, Luther Hill; directors, H. A. Grout, E. Jones, E. E. Kent, John O'Gara, C. N. Bonty, E. R. Wheeler.

*Stevens Point, Wausau & Northern.*—Mr. George Bradish, of La Crosse, Wis., is Engineer in charge of the preliminary surveys for this new road.

*Wabash, St. Louis & Pacific.*—Mr. Thomas McKissick, of St. Louis, has been appointed Receiver of the Omaha Division, in the suit begun to foreclose the mortgage on that division.

*West Jersey.*—At the annual meeting in Camden, N. J., March 2, the following directors were chosen: J. N. DuBarry, Thomas H. Dudley, Charles E. Elmer, Coleman F. Leaming, Benjamin F. Lee, John M. Moore, James H. Nixon, George B. Roberts, N. Parker Shortridge, Edmund Smith, Henry D. Welsh, George Wood. The board re-elected George B. Roberts President; W. J. Sewell, Vice-President; W. Taylor, Secretary and Treasurer.

The company's leased lines elected officers as follows: *West Jersey & Atlantic.*—President, George Wood; Vice-President, W. J. Sewell; Secretary, H. C. Fries; Treasurer, W. Taylor. *Woodstown & Swedesboro.*—President, W. J. Sewell; Secretary and Treasurer, W. Taylor.

*West Jersey Ferry Co.*—At the annual meeting in Camden, N. J., Feb. 25, the following directors were chosen: Maurice Browning, James B. Dayton, Wistar Morris, Edward Roberts, Jr., Wilbur F. Rose, Wm. J. Sewell, Edmund Smith, John B. Starr, Peter L. Voorhees.

*West Shore.*—Mr. George H. Huntington has been appointed Superintendent of the terminals in New York. He was formerly Freight Agent in Buffalo.

*Wisconsin, Iowa & Nebraska.*—President B. T. Wilson announces the following appointments: Mr. J. V. Johnson, Assistant to the President; George T. McMichael, General Manager; Wm. T. Block, Traffic Manager and Acting Superintendent.

#### PERSONAL.

—Mr. A. Marcus has resigned his position as a director of the New York, Ontario & Western Company.

—Mr. John B. Kerr has resigned his position as a director and Vice-President of the New York, Ontario & Western Co. He will remain Counsel for the company.

—Mr. E. Fitzgerald has resigned his position as Master of Transportation of the Grand Rapids & Indiana road to take charge of the blast furnace at Mancelona, Mich., for a new company just formed.

—Mr. J. C. Dowd has resigned his position as Roadmaster of the Missouri & Arkansas Division of the Texas & St. Louis road, to take effect March 1. It is understood that Mr. Dowd will accept a position on the Louisville, New Orleans & Texas road.

—Mr. G. Bouscaren has resigned his position as Consulting Engineer of the Cincinnati, New Orleans & Texas Pacific road. He has been connected with the Cincinnati Southern almost from the first commencement of the road as Assistant Chief and Consulting Engineer, and has retained the last named position since the lease of the road.

—Mr. Jesse W. Starr, Sr., the founder of the Camden Iron Works in Camden, N. J., died Feb. 27, aged 76 years. Mr. Starr started his iron works in Camden nearly 50 years ago, and gradually built them up until he owned one of the most extensive establishments in the country. He was largely

interested in the Cam len & Atlantic and one or two other local roads.

—Gen. Edward F. Winslow has resigned his position as a director of the New York, Ontario & Western Co. He was President for several years, and up to the last annual meeting. He now resigns from the board because he no longer has an interest in the property. He only consented to a re-election at the annual meeting at the special request of several of the new directors, who desired the benefit of his long experience in the management.

—Mr. T. C. Dutro died in Leadville, Col., Feb. 24, from accidental injuries received while examining a mine in which he was interested near that place. Mr. Dutro had been for 25 years past a resident of St. Louis and during all that time had been engaged in the manufacture of car wheels. He was connected at various times with the St. Louis Railway Supply Co., the Green Car Wheel Works, the St. Louis Car Wheel Co. and the Dutro Car Wheel Works.

—Mr. John Newton King, Master Car-BUILDER of the Chesapeake & Ohio road, was run over and killed by a shifting engine on the morning of Feb. 25, while crossing a track near the shops in Richmond, Va. Mr. King was born in Hanover County, Va. When boy went to Richmond and served an apprenticeship at the carpenter's trade. He worked in the Richmond, Fredericksburg & Potomac Railroad shops for several years, and afterward accepted the position of assistant to Master Car-BUILDER Chiles, of the Chesapeake & Ohio shops. At the death of Mr. Chiles he was appointed to fill the vacancy, and had held the position ever since.

—Mr. W. F. Hallstead, who has just been made General Manager of the Delaware, Lackawanna & Western road, entered the service of the company in 1855 as foreman of a gang of men employed in the construction of the Northern Division from Scranton to Great Bend. After the completion of the road he was made conductor of a gravel train, subsequently of a freight and of a passenger train. In 1860 he was made Yardmaster at Scranton, and in 1863 Assistant to Mr. John Brisbin, then Superintendent of the road. In 1866 he succeeded Mr. Brisbin as Superintendent of the main line, and was afterward made General Superintendent. He had charge of the construction of the New York, Lackawanna & Western road, and on its completion that line was placed under his charge. The office of General Manager, to which he is now promoted, is a new one on this road, the President of the company having always been its chief executive officer.

—The Boston *Advertiser* of March 3 says: "Mr. Ralph Crooker died at his residence in the Roxbury District yesterday. He was born in Bridgewater, Mass., May 28, 1801, and came to Boston when about 21 years of age. He was identified with the late Horace Gray and connected for many years with the iron works on the Milldam, and afterwards, and for more than 30 years, Superintendent of the Bay State Iron Co. in South Boston. He was, in fact, engaged all his life in the iron industry. He built all the mills and furnaces of the Bay State Iron Co. and made the rails for the first mile of railroad ever built in the United States, namely, the Granite Railroad in Quincy, Mass. He was an authority on all matters pertaining to the manufacture of iron and was frequently consulted on the subject by eminent men, both of this and other countries. He was a man of strong character, indomitable will and of uncompromising honesty. He belonged to a generation of strong men, physically and mentally, and one whose life was mostly, almost wholly, spent in hard work, and that of a character which was useful to his fellow men."

—Mr. Tompkins A. Lewis, for many years connected with the management of the Erie Fast Freight Line, died at his residence in Indianapolis, Feb. 27. He had just returned from a trip to California, taken in the hopes of benefiting his health. Mr. Lewis was born in New York City, but went to Indiana when still a boy. In 1857 he went to Indianapolis as a clerk in the United States Express office, and some years afterward took the Indianapolis agency of the Great Western Dispatch, to which was subsequently added that of the Erie & Atlantic line. In 1865 he was made General Manager of the Great Western Dispatch and continued at the head of that line for several years, and in 1875 was made Assistant Manager of the Erie & Pacific Dispatch, in which several other fast freight lines were then merged. He held this position until 1884, when he was made General Manager of the line, on the resignation of H. W. Duval, and continued in charge of all the Erie fast freight lines until last December, when he resigned on account of failing health. Mr. Lewis was also for two or three years a director in the Chicago & Atlantic Co., but took no active part in the management of that road.

—Mr. Phinehas Pomeroy, one of the oldest civil engineers in the West, died at his residence in Winchester, Ind., Feb. 13, aged 85 years. Mr. Pomeroy was born in New York and in 1820 commenced life as assistant in the engineering corps employed on the Erie Canal, where he remained for five years. In 1825 he went to Ohio and was employed under the late Alfred Kelly, of Columbus, in the construction of the canals in that state. Some years later he was employed in the location and construction of the Mad River & Lake Erie, the first railroad in Ohio, and in 1840 he went to Kentucky, being employed by the State as Engineer of the internal improvement system then projected. He was afterward Chief Engineer of the railroad from Frankfort, Ky., to Lexington, which subsequently became part of the Louisville, Cincinnati & Lexington road. After the completion of this line he returned to Ohio and a few years later settled in Indiana, where he remained actually engaged in his profession until about 10 years ago, when increasing age compelled him to retire from business. He was connected at different times either as locating or consulting engineer by nearly all the roads in Southern Ohio & Indiana. Mr. Pomeroy was probably the last survivor of the engineer corps which was engaged in the original construction of the Erie Canal.

—Edmund Heusinger von Waldegg, founder and editor of the technical journal of the German Railroad Union (*Organ für die Fortschritte des Eisenbahnwesens*) and the author of compiler of a large number of works concerning railroad engineering, including what is probably the most extensive treatise on the subject, died at his home in Hanover Feb. 2, aged 69 years.

Edmund Heusinger von Waldegg, born in 1817, was in his youth employed in the booksellers' trade, and afterward studied in Göttingen and Leipzig, devoting himself especially to mathematics, physics and mechanics. Finishing his studies he turned his attention to railroad machinery, after familiarizing himself with practice in a machine shop, entering a leading iron works, largely engaged in constructing steam-boats and then beginning to build locomotives. The first locomotive built there was taken by Heusinger, in 1841 to the Taunus Railroad, which had purchased it, and then he was made foreman of its repair shop in Castel. In 1844 he was made Second Master Mechanic of the road, and in 1846 was promoted to be Chief Master Mechanic, and head of the principal shops. In 1854 he was given charge of the location and plans of the Homburg Railroad, which was constructed five years later, and afterwards he designed two other small German roads. In 1863 he became editor of the *Organ* when

first it was taken up by the German Railroad Union, a journal which he had founded as early as 1845, but which had been since 1856 under other direction, and in this work he was engaged until his death.

Several improvements in railroad appliances were made by Heusinger, among them a locomotive valve gear praised as very simple, a car with provision for intercommunication by a side passage, a sleeping car, double disk wrought-iron car wheels and a pattern of iron sleepers much talked of some years ago.

He was the author of works on burning lime, brick and tile, on burning plaster, "The Iron Railroad," "Lubricating Apparatus and Lubricating Materials for Railroad Cars," and editor and the author of many of the articles in two encyclopedic works, the "Manual of Special Railroad Engineering" in four large volumes, and of the "Manual of the Engineering Sciences," on the same general plan, also of a yearly "Railroad Engineers' Almanac," of which 13 volumes have been published.

The "Organ" which he edited is devoted exclusively to railroad engineering, and consists chiefly of articles by railroad engineers, master mechanics, etc., beautifully illustrated by lithographic plates. It appears six times a year, each number containing probably about twice as much text as a number of the "Railroad Gazette," and perhaps four times as many engravings. There is nothing so good to show the progress of railroad engineering in Germany, and we often have occasion to copy from it.

### TRAFFIC AND EARNINGS.

#### Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Central Iowa....	\$181,863	\$170,677	I. \$11,186	6.6
Chi. & East. Ill....	260,741	236,285	I. 24,455	10.4
Chi. Mil. & St. P....	3,010,000	2,862,891	I. 147,119	5.2
Northern Pac....	1,055,976	1,123,546	D. 67,570	6.0
St. L. & San F....	584,900	618,500	D. 33,600	5.4

	Month of January :	1886.	1885.	Inc. or Dec.	P.c.
Buff., N. Y. &	Philia.....	\$169,813	\$154,281	I. \$15,532	10.1
Net earnings.....	24,787	20,707	I. 1,080	5.2	
E. Ten. Va. & G....	324,032	427,885	D. 103,833	24.3	
Net earnings.....	103,944	100,284	I. 2,660	2.6	
N. Y. & N. England....	266,265	230,420	I. 37,845	16.4	
Net earnings.....	84,992	49,792	I. 35,200	70.5	
N. Y. Sus. & W....	81,050	70,665	I. 10,985	15.5	
Norfolk & West....	218,907	229,254	D. 10,347	4.5	
Net earnings....	77,667	10,461	D. 24,794	24.1	
Northern Cen....	40,123	40,216	D. 4,093	1.0	
Net earnings....	144,289	167,732	D. 23,443	14.0	
Northern Pacific....	482,330	553,582	D. 73,252	13.2	
Net earnings....	30,052	113,008	D. 82,956	73.4	
Phila. & Reading....	2,055,583	1,846,366	I. 209,217	11.3	
Net earnings....	755,485	603,401	I. 152,084	25.2	
West Jersey....	68,493	70,119	D. 1,628	2.3	
Net earnings....	10,127	18,657	I. 470	2.5	

	Month of February :	1886.	1885.	Inc. or Dec.	P.c.
Central Iowa....	\$101,434	\$84,431	I. \$17,003	20.2	
Chi. & East. Ill....	128,465	109,252	I. 19,153	17.6	
Chi. Mil. & St. P....	1,545,496	1,345,496	I. 218,504	16.2	
Northern Pacific....	569,227	569,964	D. 737	0.1	
St. L. & San F....	302,500	302,600	D. 100	...	

	Third week in February:	1886.	1885.	Inc. or Dec.	P.c.
Buff., R. & Pitts....	\$5,692	\$18,261	I. \$7,432	41.2	
Canadian Pac....	121,000	101,000	I. 20,000	19.9	
Chi. & Alton....	147,494	136,875	I. 10,619	7.8	
Chi. & Nor'west....	407,700	317,400	I. 90,300	28.5	
C. St. P. M. & O....	97,700	71,600	I. 26,100	36.4	
Chi. & W. Mich....	24,132	14,295	I. 8,837	68.8	
C. I. St. L. & C....	40,261	43,000	I. 3,261	7.6	
Det. Lar. & No....	18,809	14,696	I. 4,113	28.0	
Illinois Central....	236,300	201,093	I. 35,297	17.4	
Iowa lines....	34,300	24,187	I. 10,113	42.1	
Long Island....	42,394	34,945	I. 7,449	21.3	
Louisv. & Nashv....	265,250	265,490	D. 240	0.1	
Mil. & Northern....	9,745	8,455	I. 1,290	15.2	
Ore. R. & N. Co....	78,606	49,762	I. 28,844	57.7	

	Year ending Dec. 31 :	1885.	1884.	Inc. or Dec.	P.c.
Atch., T. & S. F....	\$15,571,395	\$16,291,883	D. \$720,488	4.6	
Net earnings....	7,715,622	7,737,284	D. 21,662	0.3	
Kentucky Cent....	847,470	922,107	D. 75,037	8.1	
Net earnings....	272,412	318,485	D. 46,073	14.5	
Oreg. Short Line....	1,833,190	1,059,199	I. 773,991	73.1	
Net earnings....	557,909	288,630	I. 269,270	93.3	

	Month of December :	1885.	1884.	Inc. or Dec.	P.c.
Atch., T. & S. F....	\$1,253,374	\$1,235,083	I. \$18,291	1.5	
Net earnings....	672,684	525,873	I. 146,811	24.1	
Clev. & Canton....	26,483	22,710	I. 3,773	16.6	
Net earnings....	6,402	2,979	I. 3,423	114.8	
Kentucky Cent....	60,019	66,730	D. 6,711	10.0	
Net earnings....	19,318	13,130	I. 6,188	47.6	
Oreg. Short Line....	155,464	93,433	I. 62,031	66.4	
Net earnings....	29,893	16,377	I. 13,516	82.4	
So. Pacific Co....	2,655,135	2,699,330	D. 44,195	1.6	
Net earnings....	1,426,817	.....	.....	.....	

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

#### Coal.

Coal tonnages for the week ending Feb. 20 are reported as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Anthracite.....	599,155	352,291	I. 246,864	70.1
Black bituminous....	196,389	163,329	I. 33,060	20.3
Coke.....	25,670	48,774	D. 23,104	47.3

The anthracite market is reported unsteady and prices are very low, in view of the large production and the absence of any agreement among the companies.

The Buffalo Express of Feb. 26 says: "A morning paper a few days ago announced that Messrs. Bell, Lewis & Yates had secured the contract for supplying the Grand Trunk with coal during the year, to the exclusion of other shippers. The contract amounts to about 400,000 tons, and, of course, would be a big thing for the firm getting it. But it happens that every other shipper was not shut out, Mr. Galusha A. Grow, for the Brady's Bend Mining Co., whose mines are tributary to the Buffalo, New York & Philadelphia, securing 130,000 tons of the order. The Erie comes in for the haul on the coal from the Dagus mines, which belong to it, but are handled by Bell, Lewis & Yates."

The Buffalo, New York & Philadelphia Railroad carried 200,475 tons of anthracite and 944,700 tons of bituminous coal during the year ended Sept. 30 last.

Cumberland coal shipments for the two months to Feb. 27 are reported by the Cumberland Civilian as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Baltimore & Ohio R. R....	252,224	243,865	I. 8,359	3.4
Bedford Div., Penna. R. R....	51,595	24,368	I. 27,027	110.7
Total.....	363,619	268,233	I. 35,386	13.2

Local deliveries are included in the Baltimore & Ohio tonnage. Shipments from mines for the two months were: Cumberland & Pennsylvania, 175,476; George's Creek & Cumberland, 63,725; West Virginia Central & Pittsburgh, 30,832; total, 270,033 tons.

Anthracite coal tonnage passing over the Shamokin Division, Northern Central road, for the two months to Feb. 27 was this year, 145,801; last year, 130,413; increase, 15,188 tons, or 11.6 per cent.

The anthracite tonnage of the Belvidere Division, Pennsylvania Railroad, for the two months to Feb. 27 was:

	1886.	1885.	Inc. or Dec.	P.c.
S. Amboy for shipment.....	98,802	68,546	I. 21,236	30.8
Local points on N. J. divs....	150,385	122,015	I. 28,380	23.3
Co. 's use .....	41,003	36,532	I. 4,471	12.3
Total .....	281,200	227,93	I. 54,107	23.8

Of the total this year 222,687 tons were from the Lehigh Region and 58,513 tons from the Wyoming Region.

A general strike of miners is threatened, to include the Cumberland and Clearfield regions and the adjoining districts in Pennsylvania and Maryland.

The coal tonnage of the Pennsylvania Railroad for the two months to Feb. 27 was:

	1886.	1885.	Inc. or Dec.	P. c.
Coal.....	1,936,179	1,55,560	I. 380,619	24.4
Coke.....	334,003	370,076	D. 36,073	9.7
Total.....	2,270,182	1,025,636	I. 344,546	17.9

This includes all coal and coke passing over the road, whether mined on the line or received from connecting roads.

### Cotton.

Cotton movement for the six months of the crop year from Sept. 1 to Feb. 26 is given by the Commercial and Financial Chronicle as follows:

	1886-87.	1884-85.	Inc. or Dec.	P. c.
Receipts.....	2,039,335	2,419,820	I	

**Buffalo, New York & Philadelphia.**—The statement for January and the four months of the fiscal year from Oct. 1 to Jan. 31 is as follows:

December		Four months	
1885.	1885.	1885-86.	1884-85.
Earnings....	\$169,813	\$154,281	\$826,021
Expenses....	148,926	133,574	571,140
Net earnings....	\$21,787	\$20,707	\$199,488
			\$193,070

For the four months the gross earnings increased \$61,811, or 8.1 per cent., and the expenses \$55,393, or 9.7 per cent., leaving a gain of \$6,418, or 3.3 per cent., in net earnings.

The foreclosure suit brought by Henry Martin and F. D. Locke, trustees, has been discontinued, the overdue interest on the bonds represented by these trustees having been paid. The withdrawal was by agreement.

The reorganization committee publishes a notice requesting holders of Buffalo, New York & Philadelphia first 6s and second 7s, Warren & Franklin firsts and Oil Creek firsts, to present their bonds at the office of Drexel, Morgan & Co., in New York, that firm having agreed to purchase them at par and accrued interest. The bonds named are prior liens upon indispensable portions of road, without which the property would have very small value. Their holders have generally refused to join in any plan of reorganization which would reduce their interest or involve the surrender of their prior liens, and, as the only means of getting them out of the way, the parties who control the reorganization have evidently determined to buy them up. The Buffalo bondholders some time ago expressed themselves plainly, having held a meeting and passed a resolution demanding par and accrued interest for their bonds, and these terms are now offered them.

**Central Iowa.**—The bridge over the Mississippi at Keokuk, Ill., which connects this company's lines in Iowa with the lines in Illinois, was completed on Feb. 22, when locomotives passed over.

It is said that work will be pushed on the line from Keithsburg to Lacon, to build which the Chicago & Central Iowa Co. has been organized.

**Central, of New Jersey.**—In Trenton, March 2, the Chancellor refused a motion made on behalf of the Reading Co. to reopen the Vail case, in which the lease of the Central road to the Reading was decided to be invalid. The Chancellor further made an order requiring the Philadelphia & Reading Railroad Co. to turn over the Central Railroad to the managers of that company.

It will be remembered that at the hearing of the Central Railroad suit, before the United States Circuit Court in Pittsburgh, Mr. Gowen asked for 30 days' delay, promising during that time to make a proposition for the equitable settlement of all difficulties. So far he has presented no proposition.

**Central Pacific.**—On the extension of the Oregon Division track is now laid to Portuguese Flat, Cal., 5½ miles north of the old terminus at Redding, and a force of about 100 men is employed on the grading and the tunnel to the northward. The road is being constructed in a very substantial manner, and will be an expensive piece of work, as several tunnels and a number of bridges and some heavy cutting and filling will be required. There is considerable uncertainty as to the resumption of work on the Oregon end of the line, as the negotiations for the purchase of the Oregon & California Railroad have not yet come to a final conclusion on account of legal obstacles.

**Chatham Beach.**—It is proposed to build a railroad about 4 miles long from Harwich, Mass., on the Cape Cod Division of the Old Colony road, to Chatham Beach. Mr. Stillman Rodman, of Providence, R. I., is the chief prosector.

**Chesapeake & Ohio.**—The Cincinnati Times-Star of Feb. 25 says: "There has been a good deal said for six or eight years past about the intention of the Chesapeake & Ohio Railroad to build a bridge over the Ohio River at Cincinnati. Now it is certain that the bridge will be built, and that within a short time. It is a part of the company's plans to have as little said about the matter in advance of the actual building operations as possible, and for that matter it is difficult to learn all the details. The local representatives become as talkative as clams immediately the word bridge is spoken, and the general officers have 'nothing to say.' However, there is the best of reasons for believing that the bridge will be built very soon. It is a matter of fact that the contracts have been given out, and that one of the conditions of the contracts is that the bridge shall be completed within a year after the work is commenced."

"The bridge will come into Cincinnati at the foot of Smith street, where the Chesapeake & Ohio Co. owns considerable ground, and from that point a direct route will be taken to get into the Grand Central Depot. Already property holders living along Sixth street in Covington have been given notifications that the railroad company will need their ground, and that unless they are willing to sell at a reasonable figure condemnation proceedings will be had. The Kentucky approach will be on the sites of quite a number of residences."

"But railroads are not operated upon principles of romance or sentiment and the trains of the Chesapeake & Ohio Railroad will ere long be thundering night and day right where the peaceful citizen now is wont to seek his needed rest. The consent of the Covington Council has been obtained, the preliminaries have all been arranged, and some day a streak of smoke will be seen stretched from shore to shore about midway between the Suspension and the Southern Railroad bridges."

"It is estimated that the cost of the C. & O. bridge will amount to \$1,000,000. That is a good deal of money for a railroad company to pay for the purpose of getting three miles nearer the Grand Central Depot in this city, but, notwithstanding, it will be a good investment."

**Chicago & Atlantic.**—In the United States Circuit Court in Indianapolis, Feb. 27, the Farmers' Loan & Trust Co., trustee, filed suit against this company asking for foreclosure of mortgages and the sale of the road. The complaint alleges default in interest on three semi-annual payments on the \$6,500,000 first mortgage bonds, and also a default on the \$5,000,000 second mortgage.

**Chicago, Burlington & Quincy.**—It is understood that work will soon be begun on a branch of this company's Burlington & Missouri River line, which has been organized as the Grand Island & Wyoming Central. This branch will run from Grand Island, Neb., through the Middle Loup Valley, to Broken Arrow in Custer County, a distance of about 100 miles, and its object is to develop new country. Other proposed construction in Nebraska this year includes an extension of the Holdrege branch, westward 45 miles; branches from Tobias to Edgar, 33 miles; from Edgar to Blue Hill, 28 miles; from Edgar to Superior, 26 miles, and from Fairmont south, 15 miles. A cut off from Omaha to Ashland is also proposed, making a direct line from Omaha to Lincoln. Several of these branches we have heretofore referred to.

**Chicago, Freeport & St. Paul.**—An effort is being made to revive this project, of which nothing has been heard for some months. It is now proposed to build from Free-

port, Ill., to Seneca, instead of to Chicago. At Seneca connection will be made with the Kankakee & Seneca road, which is a branch of the Cincinnati, Indianapolis, St. Louis & Chicago.

**Chicago, Milwaukee & St. Paul.**—It is announced that as soon as the weather permits work will be actively commenced and pushed on the new line from Ottumwa, Ia., to Kansas City. The company now has under consideration a proposition for a branch to Leavenworth, Kan., from some point on the main line in Missouri.

It is said that the company will build this season an extension from Andover, Dak., northward, for the purpose of developing new country along the line. The new line, it is said, will run to Lisbon on the Northern Pacific.

The United States Circuit Court has made an order requiring this company to pay certain judgments against the Chicago & Pacific Co., whose road is now part of this company's line. These judgments have been in dispute for some time.

**Cincinnati, Indianapolis, St. Louis & Chicago.**—It is reported that this company is considering the question of extending its Kankakee & Seneca line from the present terminus at Seneca, Ill., to Mendota, a distance of about 30 miles. At Mendota connection will be made with the Chicago, Burlington & Quincy and with the main line of the Illinois Central.

**Cincinnati, Van Wert & Michigan.**—The extension of this road from its present terminus at Cecil, O., northward to Jackson, Mich., is now under contract, the work to be completed next fall. The company has also recently let contracts for the extension of the line from Manchester, O., the southern terminus, southward to a connection with the Cincinnati, Hamilton & Dayton and the Cleveland, Columbus, Cincinnati & Indianapolis roads, this portion of the work to be finished by July.

**Columbus & Maysville.**—The grading of the extension of this road from Sardinia, O., to Georgetown is completed, and the work of laying the track will shortly be begun.

**Columbus, Nebraska & Wyoming Central.**—This company has filed articles of incorporation to build a railroad from Columbus, Neb., westward to the western boundary of the state. The office is to be in Columbus, where nearly all the incorporators reside.

**Covington & Macon.**—A large force is now employed on this line from Macon, Ga., northward, and over 30 miles of the road are graded. Work is being pushed forward.

**East Tennessee, Virginia & Georgia.**—Notice is given that the Central Trust Co., in New York will, from Feb. 26, receive the income bonds deposited in trust to the plan of reorganization, and will give its receipts therefor. The assessment of \$50 per bond will not be payable until the committee is ready to deliver the securities of the new company on the completion of the reorganization. The deposit of other bonds under the reorganization plan with the Central Trust Co. to date reach \$11,879,600, including all the consolidated 5s, all the Cincinnati & Georgia bonds and a majority of the debentures.

The statement for January and the seven months of the fiscal year from July 1 to Jan. 31 is as follows:

January		Seven months	
1886.	1885.	1885-86.	1884-85.
Earnings....	\$324,032	\$47,885	\$551,491
Expenses....	220,088	327,801	1,467,034
Net earnings....	\$103,944	\$100,284	\$1,084,457
			\$955,323

For the seven months the gross earnings decreased \$5,737, or 0.2 per cent., and the expenses \$134,871, or 8.4 per cent., the result being a gain of \$19,134, or 13.5 per cent., in net earnings.

**Evansville & Indianapolis.**—This road, which was recently completed from Evansville, Ind., to Terre Haute, but portions of which have been in operation for several years, was built on the towpath of the old Wabash & Erie Canal, which was abandoned over 20 years ago, and afterward sold by the state. Mr. D. J. Mackey, who claimed to own the canal property by purchase, granted the right of way over the towpath to the company. Some time since a suit was brought by one of the owners of land along the line to recover damages for the right of way. The claim made at this suit was that at the time the canal was built the abutting land holders had granted the right of way for its construction, but that under the law and constitution of the state when the canal was abandoned the land reverted to the grantors and that the state could not sell the fee of the property. The suit was brought in the Circuit Court at Washington, Ind., and that Court has now decided that this view of the case is correct, and that the land used for the canal reverted to the original owners or their successors. The railroad company must consequently proceed under the statute to condemn the right of way in the ordinary manner, the sale of the canal not carrying the necessary title. The case will be appealed to the Supreme Court.

**Evansville & Terre Haute.**—The stock recently sold by the Louisville & Nashville Co. has, it is said, been bought by the Chicago & Eastern Illinois Co., giving that company a controlling interest in the road.

**Fremont, Elkhorn & Missouri Valley.**—Besides the completion of this road to Rapid City in the Black Hills and the extension from Chadron, Neb., west into Wyoming, the company proposes to build this year a branch from Fremont, Neb., to Lincoln, a distance of about 50 miles. A branch from Scribner to Humphrey, 45 miles in length, is also proposed.

It is stated that this company has recently sold \$1,200,000 additional bonds at private sale to Boston parties. The bonds have 47 years to run and bear 6 per cent. interest.

**Grand Trunk.**—A dispatch of March 3 to the Toronto Globe from London says: "The Grand Trunk dividend statement, published to-day, shows the credit balance to be \$54,500 after meeting the net revenue charges. This amount is applicable to the reduction of the debit balance, which was \$234,000 in June last. This leaves the debit balance a little over \$175,000 on the whole year. This result is better than was expected. The market views the statement favorably."

**Hutchinson, Glencoe & Southern.**—The St. Paul Pioneer Press says: "The directors of this company will meet in Glencoe next Monday to transact important business in the interests of that organization. It is understood that they have four propositions under consideration made them by different railroad corporations.

"First, to build and lease to the Rock Island Co. a road from Hutchinson via Glencoe to Young America.

"Second, to build and lease from Waconia to Hutchinson, leaving Glencoe out.

"Third, to aid the so-called motor line from Minnetonka via Winsted and Silver Lake to Hutchinson.

"Fourth, to aid the Austin, Mankato & St. Cloud Co. in building from Mankato to Hutchinson."

**Illinois Central.**—A Chicago dispatch of March 2 says: "General Manager Jeffrey, of the Illinois Central Railroad said to-day concerning the bridge which his company has asked permission of Congress to construct across the Ohio River at Cairo, that he could only give a general idea of what the bridge would be, but that its construction would be one of the greatest engineering feats of the age. Its cost would probably be about \$3,000,000. The bridge will have only a single track, and will be about 5,000 ft. long, exclusive of the approaches, which will be as much longer. It will be built entirely of steel, and will rest on solid piers of masonry, about 170 ft. high from the bottom of the foundation to the capstone. At least three of the spans will be 500 ft. in length, and the length of the remaining spans will depend on the relative cheapness of span work and masonry—that is, whether it is cheaper to build short spans and many piers or longer spans and fewer piers.

"It will not be a cantilever or suspension bridge, but a truss-bridge of the heaviest and most approved pattern. It is not yet settled whether it will be built with fixed spans or with one draw span; that will be decided by the result of the conference with the War Department. If it is to be a fixed span bridge, it will, of course, be somewhat higher than if built with a draw span. There is a difference of about 50 ft. between the high and low-water levels at Cairo, and an extensive bottom at the confluence of the Ohio and Mississippi rivers, across which the Illinois Central extends a distance of 6 miles on the Illinois side of the river. On the Kentucky side this bottom extends for four or five miles, to the foothills, so that in high water there is nothing above the surface except the Illinois Central tracks and the treetops. Under such circumstances it will be seen that the building of the bridge is an enterprise of no ordinary difficulty."

**Jacksonville, Tampa & Key West.**—The new terminus of this road at Sanford, Fla., is 6 miles southward from Enterprise Junction and 125 miles from Jacksonville. At Sanford connection is made with the South Florida road.

The completion of the road was celebrated on Feb. 22, when a special train took a large number of invited guests from Jacksonville and other points to Sanford, where they were received in the new Opera House. Speeches were made by Mayor Sirrine, General Manager Bentley and others, and the celebration closed with a dinner at the Sanord House. The special train carrying the guests back in the evening.

**Knoxville & Georgia.**—It is reported that a syndicate has been formed to build a railroad from Knoxville, Tenn., southward through East Tennessee and Georgia to a point not made public. It is understood that the road will be built largely for the purpose of developing the valuable mineral country along the projected line.

**Little Rock, Mississippi River & Texas.**—The trustees under the general mortgage took formal possession of this road on Feb. 28, and issued an order notifying all persons concerned, and also discharging all employees in the service of the company. This order is probably merely formal, as most of the employees will be re-engaged. The trustees have appointed Mr. Henry Wood, heretofore General Superintendent of the road, as their Agent to manage the property.

**Louisville, New Albany & Chicago.**—The price which this company pays the Indianapolis Rolling Mill Co. for the Bedford & Bloomfield road, 42 miles long, is \$200,000 cash. The road is clear of all incumbrances, but it will cost nearly an equal amount to change it to standard gauge. The transfer will be made April 1. The chief business expected is from the stone quarries along the line, which make large shipments.

**Marietta & North Georgia.**—The work on this road is advancing steadily. At latest accounts the rails were down for 4 miles beyond the point last noted, having reached a distance of 18 miles beyond Ellijay and 88 miles from Marietta.

**Marquette, Houghton & Ontonagon.**—Work has been begun on the bridge over Portage Lake at Houghton, Mich., and it is expected that it will be finished early in the spring. The bridge will connect this road with the Mineral Range Railroad at Hancock, and as soon as it is finished a third rail will be laid on it to Mineral Range road, which is 3-ft. gauge, and the standard gauge trains of the Marquette road will run through to Calumet.

**Mexican National.**—The statement for the quarter ending Dec. 31 is as follows:

	Northern Div.	Southern Div.	Total.
Earnings.....	\$133,292	\$180,284	\$312,536
Expenses.....	113,859	180,090	293,938
Net earnings.....	\$19,433	\$9,165	\$28,598
Per cent. of expenses.....	85.4	95.1	91.1

On the Northern Division the branches furnished \$4,716 of the gross and \$760 of the net earnings, the balance coming from the main line. The branches of the Southern Division earned \$21,137 gross, but cost more to operate, leaving a deficit of \$696 for the quarter.

**Mexican Railroad Notes.**—The following notes are from the Mexican Financier of Feb. 20:

The Sonora Railway transported 47,709 paying passengers in 1885, as against 36,428 in 1884.

Goods for Mexico, reaching El Paso, must now, by an order issued by Secretary Manning of the Treasury Department, be warehoused there immediately on their arrival.

The Sunday bulletins at Tlalnepantla give a good deal of business to the Central and National railroads. The Central officials find it a matter of congratulation that on Sunday last their train got to Tlalnepantla 25 minutes ahead of the National train, and in returning reached the city two hours sooner, owing to a mishap to the National's train, which fortunately resulted in no casualties. On that day the Central took out 17 carloads of people and the National 25.

Elsewhere note is made of the impetus which the reciprocity treaty, if put in operation, must give to projects of new roads to the sugar-producing districts. We learn that on that treaty hinge many large investments in new roads to interior points. The citizens of Guadalajara seem now to be in earnest as regards the building of the Central's Pacific Branch to that city, although some of the merchants fear that when Guadalajara is no longer an isolated point they will meet with sharper competition.

**Minnesota & Northwestern.**—This company has filed articles of incorporation in Illinois to build a railroad from East Dubuque to Chicago. The incorporation indicates the purpose of the Minnesota & Northwestern road not to stop at Dubuque, but to complete a line of its own from St. Paul to Chicago.

**Minnesota Railroad Charters.**—A dispatch from St. Paul, Minn., Feb. 25, says: "The Attorney General to-day filed with the Clerk of the Supreme Court an information for the purpose of procuring a writ in the nature of a quo warranto to forfeit the charters and dissolve the corporations of the following railroads: The Hastings & Dakota; Minnesota Central; Southern Minnesota; Southern Minnesota Extension, and the St. Paul & Sioux City Co., upon the ground that they have each sold the railroad for the building and maintaining of which they were incorporated, and that

they have each suspended their lawful business and have not executed any of their franchises since the conveyance of the road, and that they are kept in existence for the sole purpose of holding their land grants exempt. The proper orders have been issued by Judge Dickinson and writs have been granted. The writs further call for reversion to the state of the lands retained under each charter."

The St. Paul & Sioux City is now part of the Chicago, St. Paul, Minneapolis & Omaha; the other lines have been transferred by the respective companies to the Chicago, Milwaukee & St. Paul.

**Mississippi Railroad Commission.**—The Railroad Commissioner of Mississippi, after remaining in session for nearly a month, have completed a standard of tariff freight rates intended to apply to all the railroads in the state. The tariff will be submitted to the different railroad companies before taking effect.

**Missouri Pacific.**—This company is making arrangements to build this spring a branch about 30 miles long, from Weeping Water, Neb., to Lincoln. It is understood that the company will also build a new line about 6 miles long from Papillion to a connection with the Omaha Belt line, where the track of the Union Pacific is now used.

**New Jersey Railroad Taxation.**—In view of the recent decision of the Supreme Court on the constitutionality of the railroad tax law, and in order to prevent embarrassment to the Treasury of the state, the Supreme Court has laid down a rule for the payment of taxes in cases where railroad companies have had their appeals allowed. Where the company is organized under a special charter, it shall pay in the amount of tax required to be paid under that charter. Where a company is organized under the general railroad law, it shall pay in the amount of taxes which would be required under the old law. By the adoption of this rule the taxes which would be due the state under the old law will be paid, and the only amount remaining unpaid and in dispute, pending the further consideration of the case in the Court of Appeals, will be the difference between the tax under the old law and that assessed under the new law, and the finances of the state will suffer no embarrassment.

**New York & New England.**—The statement for January and the four months of the fiscal year from Oct. 1 to Jan. 31 is as follows:

	January	1886	1885	1885-86	1884-85
Earnings	\$208,265	\$230,420	\$1,228,989	\$1,030,124	
Expenses	183,273	180,628	762,679	755,708	

Net earnings \$84,993 \$49,792 \$466,310 \$274,826

For the four months the gross earnings increased \$198,365, or 19.3 per cent., and the expenses \$6,881, or 0.9 per cent., the result being a gain of \$191,484, or 69.6 per cent., in the net earnings.

**New York, Ontario & Western.**—It is reported that this company has finally closed a negotiation of its first mortgage bonds which will enable it to liquidate its entire floating debt and to make the permanent improvements yet required to bring the line up to the highest standard.

**Norfolk & Western.**—This company's statement for January is as follows:

	1886	1885	Inc. or Dec.	P.c.
Earnings	\$218,907	\$229,254	D. \$10,347	4.5
Expenses	141,240	126,793	I. 14,447	11.2

Net earnings \$77,667 \$102,461 D. \$24,794 24.1

Per cent. of exps. 65 55 I. 10

Freight earnings showed a decrease of only 3 per cent., but there was a decrease of 12 per cent. in passenger train earnings for the month.

**Northern Central.**—At the annual meeting in Baltimore last week, resolutions were passed strongly approving of the purchase by the company of the stock of the Beach Creek, Clearfield & Southwestern Co., and instructing the board of directors to take all necessary steps to complete the purchase and to have the present injunction restraining the company in this case set aside. The resolution was passed by a unanimous vote of the individual stockholders, the representatives of the Pennsylvania Railroad stock purposely refraining from voting.

The statement for January is as follows:

	1886	1885	Inc. or Dec.	P.c.
Earnings	\$400,123	\$404,216	D. \$4,093	1.0
Expenses	255,834	236,484	I. 19,350	8.2

Net earnings \$144,289 \$167,732 D. \$3,443 14.0

The slight decrease in gross earnings was supplemented by an increase in expenses, the result being a considerable decrease in net earnings.

**Northern Pacific.**—The statement for January and the seven months of the fiscal year from July 1 to Jan. 31 is as follows:

	December	1886	1885	1885-86	1884-85
Earnings	\$480,330	\$553,582	\$7,223,600	7,181,301	
Expenses	450,278	440,574	3,552,567	3,708,724	

Net earnings \$30,052 \$113,008 \$3,671,033 \$3,472,577

Interest, rentals, etc. 3,470,937 3,042,807

Surplus \$200,696 \$429,770

For the seven months this shows an increase in gross earnings of \$42,299, or 0.8 per cent., and a decrease in expenses of \$156,157, or 4.2 per cent., the result being a gain in net earnings of \$198,456, or 5.7 per cent. Charges increased \$427,530, or 14.0 per cent., leaving a decrease of \$229,074, or 53.3 per cent., in surplus.

The land sales for the seven months were 232,716 acres; the amount of sales, including town lots, being \$895,526.

It has been reported for some time that this company would build a branch to the important town of Butte, Mont. It is now stated that no new road will be built, but that the company has made arrangements with the Union Pacific by which it will secure the use of the Utah & Northern tracks from Garrison to Butte with the right to lay a third rail to accommodate its trains.

**Old Colony.**—The consolidation of the Lowell & Framingham Co. with this company has finally been completed and the necessary certificate filed. The consolidation was arranged some time ago; the Lowell & Framingham road was leased by the Old Colony Co. at the same time that it leased the Boston, Clinton, Fitchburg & New Bedford road.

**Ormsby & Mt. Jewett.**—A railroad is to be built from Mt. Jewett, Pa., to Ormsby, on the Bradford, Bordell & Kinzua road. It is intended to connect the narrow-gauge lines about Bradford with the Pittsburgh & Western's Northern Division.

**Pennsylvania.**—The following notice in relation to the new Relief Fund was issued on March 1:

"The feature of the Relief Fund requiring employees entering the service of the company or receiving promotion therein to accept its provisions having been found objectionable, notice is now given that no one at present in or entering the service will be obliged to become a member; and the regulation will be modified accordingly. As some employees

may have become members under a misapprehension of its features, the Pennsylvania Railroad Co. and the other companies interested will contribute to the Relief Department the full amount of the contributions for February and March due from employees who have made application for membership, which otherwise would have been deducted from their February pay. Under the provisions of this notice no deductions will be made from the pay of employees for February."

The Philadelphia *Ledger* of March 3 gives the following account of the meeting called by the company, at which delegates chosen by the employees on each division were present: "A conference was held in the employees' reading-room, in the depot at Broad and Filbert streets, yesterday, between General Manager Charles E. Pugh, of the Pennsylvania Railroad, and about 325 delegates representing the various classes of employees in all of the 27 divisions of the Pennsylvania lines. The conference began about 10 o'clock a.m., and adjourned about 7:30 p.m., having finished the business for which it was called. Lunch was provided by the company in the building for the delegates.

"At the opening of the conference Mr. Pugh briefly reviewed the steps that had been taken for the institution of a relief department, and also referred to the objections that had been made to the proposed rules. In consequence of these objections, he said, this meeting had been called. Full and candid statements of objections were invited from all the delegates. General Solicitor John Scott, who was present at Mr. Pugh's request, made a few remarks relative to the proposed rules, and said that the company intended the relief department to be for the benefit of the men.

"Newspaper reporters and others who were not delegates were not admitted to the conference, but after the adjournment statement, prepared by General Manager Pugh, was furnished for publication. It set forth that nearly every class of employee in every division took advantage of the opportunity given them to speak either in favor of or against the entire relief system or any of its features. They not only handed in written reports of the proceedings of the various meetings that have been held in relation to the relief department, but also gave verbal expressions of the sentiments of those whom they represented and of their own individual opinions.

"It was stated that, while the most kindly feeling had been expressed toward the company and its officers, the criticisms of the features of the Relief Department, throughout the conferences, were candid and outspoken, and the drift of the sentiment was against its adoption." The reasons for this were too many to enumerate. One, however, that was prominent from almost every division, was that the various classes of employees had already taken life insurance in amounts as large as they felt able to carry, and did not wish to be placed in the position of either relinquishing what they had or being obliged to accept the provisions of the Relief Department.

The meeting adjourned with three cheers for General Manager Pugh and three more for 'No Relief.'

"In addition to the foregoing statements a number of the delegates said that a vote of thanks had been extended to Mr. Pugh for his courtesy throughout the proceedings. They said that the engineers and firemen were 'solid against the relief plans'; that perhaps about one-third of the delegates favored the plans with numerous modifications, and perhaps about two-thirds were 'opposed to the Relief Fund in any form.' They said, however, that until after the examination of all the papers that had been handed in, it could not be known exactly how many favored and how many opposed the plans. They said that probably a considerable number of old men favored it, because of the provisions of other insurance associations in relation to old men.

"Among the delegates who manifested the greatest opposition to the plans, it was said, were those from New Jersey, Delaware, Maryland, New York and Altoona. The plans received considerable support from Philadelphia employees. At the closing of the conference, it was said, Mr. Pugh stated that in a short time all the resolutions, proposed amendments, etc., that had been submitted would be considered, and the employees would soon hear the result. Being asked whether the Pennsylvania Railroad Company considered the Relief Department as established or not, Mr. Pugh replied that he would 'answer that question later on,' but the employees would not have to wait for the answer until the 25th inst., before which time those desiring to withdraw their applications for membership are expected to give notice."

**Philadelphia & Reading.**—The Receiver's statement for January and the two months of the fiscal year from Dec. 1 to Jan. 31, gives the earnings of the railroad as follows:

	January	1886	1885	Two months
Earnings	\$2,055,583	\$1,846,366	\$1,648,112	\$4,161,929
Expenses	1,200,698	1,242,965	2,706,235	2,637,517

Net earnings \$755,485 \$603,401 \$1,941,887 \$1,524,412

For the two months the gross earnings increased \$486,183, or 11.7 per cent., and the expenses \$68,708, or 2.6 per cent., leaving an increase in net earnings of \$417,475, or 27.4 per cent.

The traffic reported for the year was:

	January	1886	1885	Two months
Passengers	1,838,681	1,751,573	3,772,892	3,494,604
Tons merchandise	681,810	564,139	1,486,781	1,125,648
Tons coal	794,128	669,637	1,990,823	1,628,683
Tons coal on colliers	38,179	41,596	83,305	81,736

This shows a considerable gain both for the month and the year.

The statement for the Philadelphia & Reading Coal Iron Co. is as follows:

	January	1886	1885	Two months
Earnings	\$914,359	\$844,789	\$2,259,617	\$1,919,611
Expenses	1,063,760	905,634	2,484,587	2,030,010

Deficit \$149,401 \$60,845 \$224,070 \$10,399

For the two months the gross earnings increased \$340,006, or 17.7 per cent., and the expenses \$454,577, or 22.4 per cent., leaving an increase in deficit of \$114,571, or 103.8 per cent.

The coal mined from the company's lands was as follows:

	January	1886	1885	Two months
By Coal and Iron Co.	293,905	246,291	788,950	621,018
By tenants	41,625	40,979	115,605	96,718

Total 334,830 287,270 904,645 720,736

The total increase for the two months was 183,909 tons, or 25.5 per cent.

The joint net result for the two companies was as follows:

	January	1886	1885	Two months
Railroad Co. net	\$755,485	\$603,401	\$1,941,887	\$1,524,412
Coal & Iron Co. def.	149,401	60,845	224,070	110,399

Total net \$606,084 \$542,556 \$1,716,917 \$1,414,013

Total net increase for the two months, \$302,904, or 21.4 per cent. As the expenses given above do not include anything for interest or rentals, the net earnings given above are the sums from which all fixed charges are to be provided.

It is stated that the purchase of the Vanderbilt stock in this company included 87,000 shares, and that it was made

at 24, or \$12 per share, the Reading stock having a par value of \$50. The purchase, it is stated, was made by a syndicate in New York, at the request of Mr. Gowen. This syndicate, or pool, was hurriedly formed, and several of the members went into the business merely as a speculation and not from any special consideration for Mr. Gowen. Of the 67,000 shares, it is stated that Mr. Gowen took 10,000 for himself, 15,000 were taken by Mr. Alfred Sully, 10,000 each by Mr. Charles F. Woerishoffer and Mr. Addison Camack and the firm of Maxwell & Graves, and the remaining 17,000 in smaller lots. Maxwell & Graves and Mr. Sully are connected with what is known as the Corbin syndicate. Mr. Sully is a large holder of Reading bonds, which, it is understood, he bought on speculation, believing that they were worth more than the prices at which they were selling at the time of his purchase.

It is stated that the purchase of this Reading stock did not include any purchase or negotiation for the Vanderbilt interest in the South Pennsylvania.

The reorganization trustees have held several sessions for the purpose of completing their plan, and also of finally completing the agreement with the syndicate. As to the latter, reports are current that there have been some difficulties, the trustees not being altogether disposed to agree with the syndicate on all points.

The latest report in relation to the reorganization of this company is to the effect that the Drexel syndicate has made propositions to Mr. Gowen, requesting his co-operation, and that Mr. Gowen has agreed to join them on condition that so much of the syndicate's plan as involves the subjection of the Reading to the control of the Pennsylvania Railroad Co. must be dropped and the Reading must be reorganized as an entirely independent company. On the other hand, it is asserted that this rumor is not true and that no proposition of any kind has been made to Mr. Gowen by the syndicate, but that Austin Corbin, of New York, who was reported to be the head of the combination formed to support Mr. Gowen, has joined the Drexel syndicate. It is not at all impossible that some negotiations are on foot between Mr. Gowen and the syndicate with the view of arranging some compromise.

In Philadelphia, March 3, Mr. Austin Corbin appeared before the Reorganization Trustees and urged that there be no compulsory assessment of the stock, and that stockholders who do pay an assessment shall receive 4 per cent. bonds for the amount. Mr. Corbin said that he represented only himself and Mr. Sully, who were now the largest stockholders, and that he did not appear for any other person.

**Pontiac & Pacific Junction.**—This road has been completed and opened for traffic from the junction with the Canadian Pacific at Aylmer, Ont., near Ottawa, westward to Shawville, 37 miles, and the track is laid for 4 miles beyond that point. The line is intended to run from Aylmer to a connection with the Canadian & Pembroke road at Pembroke, and grading is in progress for some distance beyond the end of the track.

**Port Royal & Augusta.**—The old suit to set aside the foreclosure under which this road passed into possession of the present company and the lease of the road to Knoxville & Augusta Co., in which no action has been taken for nearly a year, was brought up in the Superior Court at Augusta, Ga., last week, and arguments will be heard shortly.

**Rome, Watertown & Ogdensburg.**—Arrangements have been completed for building an extension of this road from Norwood, N. Y., northeast to Massena, on the St. Lawrence River, a distance of 13 miles. The right of way has been given to the people along the line, and the contract for grading has been let to Mr. James Wright, who is to begin work on December 1, 1886. The extension is probably meant to connect with the proposed new bridge over the St. Lawrence and a new line to Ottawa.

**St. Paul, Minneapolis & Manitoba.**—A St. Paul dispatch reports that this company has concluded a passenger traffic agreement with the Canadian Pacific Co. It is understood that this agreement includes an equalization of rates by the Canadian Pacific to all points on the Manitoba, by which arrangement

ment requirements. The mileage worked is: Atlantic system, 1,673; Pacific system, 3,004; total, 4,677 miles.

**Shenango & Allegheny.**—In Pittsburgh, Feb. 27, counsel for F. W. Whitridge began suit to recover overdue interest on certain bonds. The road has been in the hands of a receiver for some time past, and there has been considerable talk about a reorganization, but nothing has so far been done. It is understood that the present suit is intended to bring matters to a head, and to secure the sale of the road and the reorganization of the company.

**Texas & Pacific.**—The Receivers have made an arrangement with the Fidelity Trust Co., of Philadelphia, to purchase the March coupons on the first-mortgage Eastern Division bonds. The amount of these bonds is \$113,520, and the Trust Co. has agreed to carry them until the Receivers can pay the amount from the current earnings of the road. So far the Receivers have applied all the net earnings to make necessary repairs on the line.

A New Orleans dispatch says that the Receivers have applied to the Court for authority to issue certificates to the amount of \$3,000,000, the money raised in these securities to be used to pay off present liabilities and make necessary improvements of the road.

The men employed in the shops at Marshall and Fort Worth, Tex., struck on March 2, no attention having been paid to their request for an increase in wages. Other grievances are the refusal to reduce the hours of labor and the discharge of a number of men from the Marshall shops. The strike is general, including not only the shop hands, but all the men employed by the road who are connected with the Knights of Labor. At latest accounts all freight traffic was stopped on the road, and only passenger trains were allowed to go through.

**Texas & St. Louis.**—The Farmers' Loan & Trust Co. in New York, as agent of the Reorganization Committee, offers for sale \$900,000 first-mortgage trust certificates, being part of those provided for in the reorganization agreement. Bids for these bonds will be received until March 11.

**Toledo, Cincinnati & St. Louis.**—Arrangements are reported in progress for changing this road from 3 ft. to standard gauge, and the standard-gauge ties are now being distributed along the main line.

**Union Pacific.**—In Washington, March 1, the Court of Claims made a decision in the case between this company and the government, which is, the Court says, based on decisions of the United States Supreme Court. The decision is to the effect that the right of the government to retain the compensation to the company for mail and other government business, under the provision of the subsidy act and the sinking fund act, applied only to the 865 miles owned by the company, on which subsidy bonds were issued by the United States, and does not apply to the 2,175 miles of road operated by the company, which have been built without aid from the government.

**Wabash, St. Louis & Pacific.**—The United States Court at Kansas City, Feb. 27, made an order appointing Mr. Thomas McKissick, of St. Louis, Receiver of the Omaha Division in the suit begun by the United States Trust Co. to foreclose the mortgage on that division. The Omaha Division extends from Pattonsburg, Mo., to Council Bluffs, Ia., 144 miles, and the amount of the first mortgage is \$2,500,000. The suit in foreclosure was begun some time ago.

**West Jersey.**—This company's statement for January is as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Earnings	\$68,493	\$70,119	D. \$1,626	2.3
Expenses	49,366	51,462	D. 2,006	4.1

Net earnings \$10,127 \$18,657 I. \$470 2.5  
The directors have declared a dividend of 3 per cent., payable in March, which makes 6 per cent. paid on the stock for the year 1885.

**Wilmington, Chadburn & Conwayboro.**—Arrangements are being made to extend this road from Mt. Tabor, N. C., to Conwayboro, S. C., a distance of 22 miles. Horry County, in which the town of Conwayboro is, will issue \$80,000 in county bonds in aid of the road. It is now in operation from Chadburn, on the Wilmington, Columbia & Augusta road, to Mt. Tabor, 14 miles.

**Worcester, Nashua & Rochester.**—The Committee on Railroads of the Massachusetts Legislature has voted unanimously to report favorably a bill ratifying the lease of this road to the Boston & Maine Co. The committee has reached this conclusion after hearing arguments from a number of interested parties.

#### ANNUAL REPORTS.

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the current volume of the *Railroad Gazette*:

	Page.	Page.	
Baltimore & Philadelphia	15	N. Y., N. Haven & Hartford	13
Boston & Lowell	15	N. Y., Ontario & Western	15
Boston & Maine	23	N. Y., Providence & Boston	25
Boston & Providence	15	N. Y., Railroad Commission	33
Buffalo, N. Y. & Philadelphia	16	N. Y., Susquehanna & Western	139
Charlotte, Col. & Augusta	155	N. Y., West Shore & Buffalo	58
Chester	104	Norfolk & Western	104
Chicago & Alton	156	Northern Central	156
Cin. & Orleans & Tex. Pacific	150	Northeastern (South Carolina)	16
Connecticut River	85	Pittsburgh & Lake Erie	48
Consolidation Coal Co.	139	Pittsburgh Junction	56
Del. Lacka. & Western	104, 153	Pittsburgh & Titusville	68
Denver & Rio G. ande	159	Pitts., M. K. & Youghiogheny	68
Fitchburg	68	Portland & Ogdensburg	120
Huntingdon & Broad Top Mt.	120	Rome, Wat. & Ogdensburg	85
Ia. & St. Louis, Inc. No. 1	120	Rochester & Pittsburg	86
Lehigh Coal & Navigation Co.	140	Rochester, Fred. & Potomac	86
Lewish Valley	68	Rome, Wat. & Ogdensburg	85
Leh. & W. Va. Barre Coal Co.	139	St. Paul & Duluth	155
Maine Central	18	St. Paul & Duluth	155
Michigan Central	18	St. Paul & Duluth	155
Mississippi & Tennessee	124	St. Paul & Duluth	155
New Orleans & Jackson & Col.	104	St. Paul & Duluth	155
Naugatuck	26	Western Maryland	139
New London Northern	120	Wilmington, Col. & Augusta	104
N. Y. & New England	16	Wilmington & Weldon	104

#### Ohio & Mississippi.

The company owns a line from Cincinnati, O., to East St. Louis, Ill., 338 miles, with a branch from North Vernon, Ind., to Louisville, Ky., 53 miles. It also owns the Springfield Division, from Beardstown, Ill., to Shawneetown, 224 miles, making 615 miles in all. The following statement has been issued for the year ending Dec. 31:

The earnings of the Main Line and Louisville Branch, 391 miles, were as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Freight	\$1,083,605	\$1,863,078	I. \$120,527	6.5
Passengers	1,095,848	1,274,017	D. 178,199	14.0
Mail and express	226,514	224,399	I. 2,115	0.9

Total	\$3,305,957	\$3,361,524	D. \$55,557	1.6
Expenses	2,201,100	2,521,828	D. 320,728	12.7

	\$1,104,867	\$839,693	I. \$265,171	31.6
Gross earn. per m.	8,455	8,597	D. 142	1.6
Net " " per m.	2,826	2,148	I. 678	31.6

P. c. of exps.....	66.6	75.0	D. 8.4	...

The increase in net earnings here was secured entirely by a large reduction in expenses.

The earnings of the Springfield Division, 224 miles, were as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Freight	\$232,697	\$181,002	I. \$51,095	28.1
Passengers	119,682	138,498	D. 18,810	13.6
Mail and express	21,260	21,333	D. 66	0.3

Total	\$373,648	\$341,435	I. \$32,213	9.4
Expenses	443,546	404,903	I. 38,641	9.5

Deficit	\$69,898	\$63,470	I. 6,428	10.1
Gross earn. per mils	1.068	1.524	I. 144	9.4

Per cent. of exps.....	118.7	118.6	I. 0.1	...
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The interest on the bonds of this division amounts to \$140,690, making a total deficit of \$210,528 last year.

The earnings of the entire line for the year were as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Earnings	\$3,679,515	\$3,702,958	D. \$23,344	0.6
Expenses	2,644,646	2,916,733	D. 282,087	9.6

Total	\$1,034,969	\$776,226	I. \$258,743	33.3
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Net	5,983	6,021	D. 38	0.6
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Per cent. of exps.....	71.9	79.0	D. 7.1	...
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The net earnings for 1885 were sufficient to pay interest on all the outstanding bonds and leave a balance of \$8,479 for the year.

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The net earnings for 1885 were sufficient to pay

rent for the terminal facilities in Dubuque and in Chicago owned by the Illinois Central Railroad Co. In 1884 the loss of the Illinois Central Railroad Co. was \$32,855, on a like basis.

"In again bringing to the attention of the stockholders the unsatisfactory results obtained in Iowa, your directors deem it proper to explain how completely the conditions of railway business have changed since these leases were made in 1867. An immense immigration was then pouring into Iowa and the states beyond. Sioux City, the terminus of the Iowa Division, was the chief *entrepôt* for supplies on the Missouri River. No other railroad than the Dubuque & Sioux City and its feeders existed in the northern half of Iowa, excepting about 80 miles of the Prairie du Chien road running northward from McGregor. There were then only 1,233 miles of railroad in the state. Railroad charges had been advancing for several years, and then stood about 4 cents per mile for passengers and 3½ cents per ton-mile for freight, and taxes were 1 per cent. of the gross earnings. There are now 7,509 miles of railroad in Iowa, and the rates are less than 3 cents per mile for passengers and 1½ cents per ton per mile for freight while rates exceed 4 per cent. of the gross earnings. Sixteen different railroads, controlled by other corporations, cross the Iowa Division at different points, forming, in several cases, shorter lines to Chicago and the East, and diverting business to such an extent that while 10 years ago the gross earnings of the Iowa Division were \$1,850,128, they had fallen to \$1,678,336 in 1885.

"In 1881, the Iowa Falls & Sioux City Railroad Co. began to take out of its income and set apart a fund to provide for the contingency of a termination of the lease, and it is understood additions have been made to the fund annually ever since. The Dubuque & Sioux City Railroad Co. appears to have made no provision in this behalf until quite recently, when the directors recommended to their shareholders that no dividends be declared for two years, and that the net earnings of the company be reserved to buy equipment and to pay for betterments. This action by the lessor companies renders it reasonably certain that at the end of the lease the Illinois Central Railroad Co. will be able to collect promptly whatever sum may be found to be due, as stipulated in the lease.

"The net earnings of the West & East Railroad, the Canton, Aberdeen & Nashville Railroad, and the Yazoo & Mississippi Valley Railroad for the past year have been \$107,823 thus giving, for the first full year of their operation, a return of fully 3½ per cent. upon the \$3,041,114 which this company has invested in those railroads.

"The Yazoo & Mississippi Valley Railroad is being extended from Yazoo City to Yalobusha River, about 70 miles, with a branch to connect this extension with the West & East Railroad at Lexington, Miss. This brings your railway within 90 miles of Memphis, to which point it is expected to extend the line during the coming year.

"The outlays during the year on capital account not charged against income have been as follows:

South Chicago Railroad	\$13,239
Canton, Aberdeen & Nashville Railroad	10,239
Yazoo & Mississippi Valley Railroad	149,78
Iowa Division	70,437
Total	\$243,663

"In view of the large number of 8 per cent. bonds of the Southern Division, amounting to \$3,210,500, falling due during the coming year, your directors decided to issue 4 per cent. bonds under the mortgage executed by the Illinois Central Railroad Co., August 10, 1874, in lieu of selling the Chicago, St. Louis & New Orleans Railroad Co. 5 per cent. bonds which are in your treasury.

"Four per cent. bonds, to the amount of \$1,500,000, have been sold at a pre-nium, and payment received in cash, since Jan. 1, 1886. The bonds do not appear as liabilities, nor their proceeds as assets, in the accompanying balance sheet and exhibits."

#### Pennsylvania Railroad.

The annual report of this company for 1884 covers in the first place the lines worked directly, which are as follows:

1. The Pennsylvania Railroad Division, including the main line from Philadelphia to Pittsburgh, 358 miles, with 1,158 miles of branches, a total of 1,516 miles, being an increase of 45 miles of branches.

2. The United Railroads of New Jersey Division, including the main line from Jersey City to Philadelphia, 89 miles, and 356 miles of branches, an increase of 2 miles; the ferries over the Hudson and Delaware rivers; the Delaware & Raritan Canal, 66 miles, a total of 445 miles of railroad and 66 miles of canal.

3. The Philadelphia & Erie Division, a main line from Sunbury, Pa., to Erie, 288 miles.

Making in all 2,249 miles of railroad (an increase of 47 miles) and 66 miles of canal, the earnings whereof were as follows:

I. PENNSYLVANIA RAILROAD DIVISION.					
1885.	1884.	Inc. or Dec.	P. c.		
Earnings	\$27,667,436	\$30,196,885	D. \$32,529,479	8.4	
Expenses	17,220,634	17,575,106	D. 354,472	4.6	
Net earnings	\$10,446,772	\$12,621,779	D. \$21,175,007	17.3	
Gross earn. per m.	18,502	21,724	D. 3,222	14.9	
Net " "	6,993	9,080	D. 2,90	22.9	
Per cent. of exps.	62.0	58.2	I. 3.8		
Net earnings as above	\$10,446,772				
Interest, rent of equipment, etc.		4,853,069			
Total	\$15,299,841				
Rentals, interest, etc.		7,140,156			
Net Income Penna. R. R. Division	\$8,153,685				

II. UNITED NEW JERSEY.					
1885.	1884.	Inc. or Dec.	P. c.		
Earnings	\$14,635,374	\$14,700,887	D. \$54,513	0.4	
Expenses	10,259,757	10,749,844	D. 490,087	4.6	
Net earnings	\$4,395,617	\$3,990,043	I. \$435,574	11.0	
Gross earn. per m.	28,736	29,419	D. 880	8.4	
Net " "	8,619	7,929	D. 699	11.3	
Per cent. of exps.	70.0	73.1	D. 3.1		
Net earnings as above	\$4,395,617				
Interest on investments		304,807			
Total	\$4,700,424				
Interest, rentals, dividends, etc.		4,859,921			
Loss on United New Jersey leases	\$159,497				

III. PHILADELPHIA & ERIE.					
1885.	1884.	Inc. or Dec.	P. c.		
Earnings	\$3,292,253	\$3,060,146	D. \$367,693	10.1	
Expenses	1,560,373	2,202,063	D. 2,02,063	9.2	
Net earnings	\$1,731,880	\$1,458,080	D. \$165,200	11.3	
Gross earn. per m.	11,431	12,729	D. 1,278	10.1	
Net " "	4,489	5,063	D. 574	11.3	
Per cent. of exps.	60.7	60.2	I. 0.5		
Net earnings as above	\$1,262,880				
Interest charged for use of equipment		193,893			
Balance, paid P. & E. Co. as rental	\$1,098,987				

#### GENERAL INCOME ACCOUNT.

The general statement of income for the year was as follows:

Net income Pennsylvania Railroad	\$8,153,685
Less loss on United N. J. leases	159,497
Net balance	\$7,994,188
Fund for purchase of securities	\$58,921
Advances to P. & E. Pennsylvania Co.	1,000,640
Consol. mortgage sinking fund	324,830
Allegheny Valley deficit on guarantees	701,575
F. edick & Pa. Line advances	15,000
America in Steamship Co. interest	90,000
Dividends, 5 per cent.	4,738,892
	6,929,558
Balance, surplus for the year	\$1,064,630
Profit and loss, balance, Jan. 1	\$14,032,918
Less accounts charged off, etc.	363,355
	13,669,563
Profit and loss, balance, Dec. 31, 1885	\$14,734,193

The total amount advanced to the Pennsylvania Co. was \$1,667,733, of which the sum of \$1,000,640 was charged to income, as above.

The report says: "The large reduction in the gross and net earnings of the Main Line is the direct result of the extremely low rates that prevailed during the entire year. Notwithstanding the fact that over 90 per cent. of your tonnage was local, yet the rates obtainable on that traffic are necessarily reduced in harmony with those prevailing on the through business, and therefore your revenue does not show the improvement that might naturally be expected from the development of the local traffic. The large annual increase in both the freight and passenger business of your lines offers the best assurance of their prosperity when remunerative rates can be obtained."

"The United Railroads of New Jersey also show an increase in both freight and passenger traffic; and while for the reasons already stated there was no increase in the gross earnings, the reduction in expenses enabled that division to show better results than for 1884.

"The Philadelphia & Erie Division shows a large gain in local tonnage, but a loss in passenger traffic, and although there was a marked decrease in both gross and net earnings, it was able to provide for its fixed charges."

#### CONSTRUCTION AND CAPITAL ACCOUNTS.

"There has been expended for construction, equipment and real estate as follows:

Pennsylvania Railroad and branches	\$147,202
Uni Ed Rail roads of New Jersey	276,449
Philadelphia & Trenton Railroad	60,258
	\$483,909

And for improvements and extensions on branch and auxiliary lines operated by the company

Advances on account of construction of new branch and auxiliary lines	\$480,554
Total	\$3,107,026
On account of these advances there has been received from some of the companies in cash	
	705,275
	2,401,731

Total amount expended on capital account in 1885. \$2,885,000

"On account of the above advances to branch and auxiliary lines there have been received in securities of those companies \$1,912,899.

"The debt due to the state of Pennsylvania on account of the purchase of the Main Line was reduced during the year by the payment of \$831,041, which was charged to capital account. The balance of the annual payment of \$460,000 (\$128,959) representing the interest upon the amount due to the state, was charged directly to income account. The balance due on account of the purchase of the Main Line is \$2,329,872.

"To provide the means to meet the expenditure on capital account on your Main Line and branches, and your affiliated roads, and to pay off such real estate mortgages and ground rents as were bearing a higher rate of interest and could be extinguished, there was sold during the past year the balance of the issue of 4½ per cent. collateral trust loan of your company, amounting to \$3,960,000. By the operation of the sinking fund \$100,000 have been redeemed and cancelled, leaving \$9,900,000 outstanding.

"Under the provisions of the consolidated mortgage of the company, there was set apart, on July 1 last, out of the net income, \$324,830 as a sinking fund for the redemption of the outstanding bonds secured by that mortgage. Their market value was too high, however, to permit of the purchase of more than \$2,000 of these securities. The balance of the fund (\$322,830) was placed to the credit of the trustees of the sinking fund, who have been able to invest the greater portion thereof in well-secured first mortgages upon real estate bearing 4 per cent. interest per annum. The \$2,000 of bonds purchased after being canceled were delivered to the trustees under the stipulations of the mortgage. The amount of bonds so purchased to date is \$1,769,070 at their par value.

"There are now in the sinking fund, for the redemption of the obligations of the various companies forming the United New Jersey Railroad & Canal Co., securities of the par value of \$3,549,900. There is also a cash balance, uninvested by the trustees, of \$34,934, making an aggregate investment of \$3,584,834, for which you will, in the future, in accordance with the terms of the lease, receive bonds to be issued under the general mortgage of that company.

"To provide for the \$500,000 of 6 per cent. bonds of the Belvidere Delaware Railroad Co., maturing Sept. 1, 1885, an issue was made and disposed of, upon satisfactory terms, of the same amount of 4 per cent. bonds secured by the consolidated mortgage of the said company due in 1925. During the past year the Flemington Railroad & Transportation Co. was merged into that company.

"An arrangement was made during the year with the Philadelphia & Erie Railroad Co., by which the unpaid and overdue coupons of the general mortgage bonds of that company, amounting to \$1,500,000, all of which belonged to the Pennsylvania Railroad Co., were funded into 4½ per cent. debenture bonds of the Philadelphia & Erie Co. due in 1915, with a sinking fund for their redemption.

"The sinking fund for the redemption of the trust certificates issued for purchase of the shares of the capital stock of the Philadelphia, Wilmington & Baltimore Railroad Co., was sufficient to enable the trustees to purchase \$368,000 of such certificates during the past year. These certificates have been cancelled as provided in the trust agreement. The general account of the Treasurer shows this reduction in the amount of outstanding certificates, and a corresponding reduction has been made on the other side of the account in the cost of the shares purchased by your company. The total amount of these certificates purchased and cancelled, to Dec. 31, 1885, is \$1,634,000, leaving outstanding \$8,866,000."

No additional equipment was furnished under car trusts last year. The total number of cars bought under car trusts is 31,148, of which 17,809 were for the lines east of Pittsburgh, 10,987 for those west of Pittsburgh, and 2,352 for

controlled lines. The total amount of car trust certificates issued has been \$16,637,000, of which \$9,620,000 have been paid, leaving \$7,017,000 outstanding on Dec. 31, 1885. The certificates paid include full payment for 9,214 cars.

#### TRAFFIC.

The following table shows the receipt and cost per passenger-mile and per ton-mile, in cents, on each of the divisions east of Pittsburgh:

Per passenger-mile:	Pa. R. R.	Un'd N. J.	Ph. & E.	All lines.
1885.	1884.	1885.	1884.	1885.
Earnings. 1,931	2,422	1,919	2,058	1,950
Expenses. 1,530	1,631	1,371	1,594	1,406
Net.... 0.401	0.701	0.548	0.464	0.755
0.701	0.548	0.464	0.755	0.918
0.918	0.464	0.755	0.918	0.484
0.484	0.637			

Per ton-mile:

Earnings. 0.027	0.740	1.249	1.305	0.498	0.576	0.605	0.804


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roads operated through its organization, and the East St. Louis & Carondelet.

The aggregate gross earnings of these roads were \$8,452,235 Expenses..... \$6,503,876

Net earnings..... \$1,948,359 Deduct rental and interest..... 1,903,214

Profit..... \$45,145

Of this profit your company, under existing contracts, is entitled to..... \$92,572 Which, deducted from the loss shown in the above statement..... 1,115,546

Leaves a net loss on all lines west of Pittsburgh for 1885..... \$1,092,974 Net loss on all lines west of Pittsburgh for 1884..... 861,891

Increase in net loss for 1885 (26.8 per cent.)..... \$231,083

"The earnings of your western lines show a further decrease, mainly on the northwestern system; and although the expenses were largely reduced, it will be noted that they show an increased loss as compared with the preceding year. This was caused, as on your lines east of Pittsburgh, by the unremunerative rates that prevailed on all classes of traffic, the tonnage showing a gain of 1,543,532 tons.

"Of the issue of \$3,200,000 of the Pennsylvania Co.'s 8 per cent bonds, secured by Pittsburgh, Fort Wayne & Chicago stock as collateral, \$886,000 have been redeemed through the operation of the sinking fund, leaving the amount outstanding \$2,314,000.

"Of the issue of its 4½ per cent. bonds, amounting to \$13,750,000, \$533,000 have been redeemed, leaving the amount outstanding \$13,217,000.

"The report made by the Trustees of the sinking funds of the first and second mortgages of the Pittsburgh, Fort Wayne & Chicago, shows that the regular annual contribution of \$104,100 was paid to the trustees of these mortgages. They redeemed during the year \$25,000 of the first mortgage, and \$90,000 of the second mortgage bonds, making the total amount redeemed to Dec. 31, 1885, \$3,498,500.

"The further sum of \$119,804 was also paid into the sinking funds provided for the redemption of the existing mortgages on the other leased lines west of Pittsburgh, in addition to the amounts contributed directly by the individual companies.

"The Grand Rapids & Indiana Railroad Co. continues to show very favorable results. The land department made sales of 17,093 acres of farm lands for \$142,982, being an average of \$8.36 per acre. The entire amount sold to the close of the year, after deducting canceled contracts, was 417,723 acres, and the aggregate price received therefor was \$5,032,952, an average of \$12.04 per acre. No bonds were redeemed by the trustees during the year out of the proceeds of such sales, and there are now outstanding \$3,934,000 of the guaranteed and \$505,000 of the unguaranteed first-mortgage land-grant bonds of the company.

"The assets on hand December 31, 1885, applicable to the redemption of the first mortgage land-grant bonds were, including cash and bills receivable, \$986,770.

"The amount expended during the year on capital account on the lines west of Pittsburgh was \$836,321.

"There were laid on the northwestern lines operated directly in your interest 4,986 tons, and on the southwestern lines 7,987 tons of steel rails."

#### SUMMARY OF ALL LINES.

The total traffic of all the lines owned and controlled east and west of Pittsburgh was as follows:

**Passenger:** ——————**Passenger-miles:** ——————  
1885. 1884. 1885. 1884.  
East of Pitts. 43,280,297 40,133,107 576,839,905 514,827,710  
West of Pitts. 11,474,534 12,189,992 357,549,531 342,588,887

Total ..... 54,754,771 52,323,099 1,234,389,436 1,157,416.97  
Tons car'd ..... Ton-miles: ——————  
1885. 1884. 1885. 1884.

**Freight:** ——————  
East of Pitts. 60,254,173 56,53,3890 5,486,163,363 5,114,912,189  
West of Pitts. 26,618,397 25,061,718 2,883,675,415 2,576,669,303

Total ..... 86,872,570 81,585,098 8,368,840,778 7,691,581,492

The earnings and expenses of all the lines were as follows:

1885. 1884. Decrease. P.C.  
Gross earn. from traffic. \$92,994,549 \$97,849,875 \$4,855,326 5.0  
Working expenses..... 61,690,901 64,434,317 2,743,416 4.3

Net earnings..... \$31,303,648 \$33,415,558 \$2,111,910 6.3

The expenses given exclude all payments for rentals, interest, dividends, etc.

The total amount of steel rails laid in 1885 on all lines owned, controlled and operated east and west of Pittsburgh was 36,042 tons.

#### GENERAL REMARKS.

"In accordance with the suggestions made in the last annual report, and in pursuance of a resolution adopted at your last annual meeting, a stock vote was taken at the office of the company, on June 30 last, on the approval or disapproval of the proposed modification in the trust created Oct. 9, 1878, which was, that the income of the fund should continue to be added to the principal, and the monthly appropriation of \$50,000 be reduced to an amount equal to 1 per centum of the net income of the company before payment of dividend to the shareholders. Of the votes cast, 485,676 were in favor of the modification, and 2,267 were against it. Your board of directors, in compliance with this action of the shareholders, have appropriated \$58,621 to the managers of the trust for the year 1885. Under its provisions, there has been paid to Dec. 31, 1885, the sum of \$8,750,000, which, with the income therefrom, has been invested in securities amounting at par to \$4,785,350, yielding an interest of 6.96 per cent. per annum upon the investment.

"The statement of the insurance fund shows assets on hand and at the end of the year of \$1,388,050, being an increase over the previous year of \$238,960.

"The policy indicated in the last report as the proper one, in the judgment of your management, to pursue—is that of strengthening and improving your property, by the construction and extension of branches intended to promote the development of the local interests of the state, and by generally increasing their facilities—was continued during the past year. The liberal expenditures heretofore made upon your Main Line and the United Railroads of New Jersey enabled your company to limit the outlays upon those properties, notwithstanding the largely increased traffic. Its continued growth, however, indicates the necessity for annually increasing these facilities, and during the present year the proper disbursements will be made for this purpose.

"The principal expenditures upon the branch and auxiliary lines were as follows: On the Tyrone & Clearfield and the Southwest Pennsylvania for providing double tracks and extending short branches; on the Pittsburgh, Virginia & Charleston for providing additional real estate and side tracks; on the Ridgway & Clearfield for completing that line to a connection with the Low-Grade Division of the Allegheny Valley Railroad, thus forming a direct connection northwardly with the Philadelphia & Erie, and furnishing an outlet for bituminous coal and other traffic; on the Philadelphia, Germantown & Chestnut Hill for additional real estate and right of way; on the Bellefonte, Nittany & Lemont for completing that line as a connecting link between the Bald Eagle Valley Railroad and the Lewisburg & Tyrone.

"The Martin's Creek railroads of Pennsylvania and New Jersey are two sections of a line connecting the Belvidere

#### GENERAL ACCOUNT, PENNSYLVANIA RAILROAD CO.

		DURING YEAR 1885.	
		Increase	Decrease
<i>Liabilities:</i>			
Capital stock.		\$94,777,850	
First-mortgage bonds, due 1880 outstanding.	\$8,000		
General mortgage bonds, due 1910.	19,990,760		\$1,000
Consolidated mortgage bonds, due 1905.	27,482,030		
Consolidated mortgage bonds, due 1910.	4,998,000		2,000
Navy Yard mortgage registered bonds, due 1901.	1,000,000		
Collateral trust loan, due 1913.	9,900,000		
Lien of the state upon the public works between Philadelphia and Pittsburgh, bearing 5 per cent. interest payable in annual installments of \$460,000, payable first, to the interest, and the remainder to principal, the original amount of which was \$7,500,000.	2,329,872		331,041
Mortgages and ground rents payable.	1,449,115		427,205
Pennsylvania Co. for insurances on lives and granting annuities, trust certificates.	67,167,672		368,000
Accounts payable, viz:	8,366,000		
Passenger balances due other roads.	\$652,166		174,02
Passenger balances due other roads.	4,079,69		194,776
Cash, dividend due to stockholders unpaid.	83,062		
Dividend \$250 outstanding.	1,531		11,348
Sundry accounts due other roads, etc.	0,598,888		1,954
	11,415,359		
Appraised value of securities owned by the United New Jersey Railroad & Canal Co., and transferred with the lease.	3,859,95		
Equipment of road and canal owned by the United New Jersey Railroad & Canal Co., and transferred with the lease.	1,720,696		260,128
Fund for the purchase of securities guaranteed by the Pennsylvania Railroad Co. under trust created Oct. 9, 1878.	\$3,758,621		58,621
Sinking fund consolidated mortgage bonds, for bonds redeemed and securities purchased.	2,091,900		324,820
Balance to credit of profit and loss.	14,734,193		701,275
	20,584,714		
Total liabilities.	\$207,891,571		\$5,717,740
Total increase.			\$1,402,676
<i>Assets:</i>			
Balance standing on the books of the company for the construction of the railroad between Philadelphia and Pittsburgh, including the original cost of the Philadelphia & Columbia Railroad (\$5,375,733), also, the branches to Indiana, Hollidaysburg, and Morrison's Cove; also, the branch to connect with the Pittsburgh, Virginia & Charleston Railroad and branch at Tyrone; also, bridge over the Susquehanna River at Columbia, and branches from Columbia to York, and Frazer to Woodland, comprising 1,257.15 miles of single track exclusive of the Harrisburg & Lancaster Railroad, 98.70 miles), and including wharves and grain elevator, and cost of stations, warehouses and shops.	\$38,200,073		\$108,385
Balance to debit of equipment of road, consisting of 1,176 locomotives, 890 passenger cars, 213 baggage, mail, and express cars, 2,219 road cars including shop machinery, steamboats, and car floats, and also including equipment of canal, consisting of schooners, barges and tugs.	24,216,890		
Cost of real estate of the company and telegraph line.	12,738,228		\$8,447
Total amount charged to construction, equipment and real estate accounts, including sidings, stations, warehouses, shops and shop machinery, canal equipment, etc.	\$75,155,191		
Other assets:			
Cost of bonds of railroad corporations.	\$33,788,545		1,280,802
Cost of capital stocks of railroad corporations.	61,026,80		1,206,461
Cost of bonds and stocks of other corporations, coal companies, canal companies, bridge companies, and investments not otherwise enumerated.	5,283,815		122,640
Total cost of bonds and stocks belonging to the company.	100,092,740		
Managers of Trust created by Pennsylvania Railroad Company, Oct. 9, 1878.	3,759,000		50,000
Freight balances due by other roads.	73,465		76,409
Insurance Fund.	10,060		
Mortgages and ground rents receivable.	19,150		20,000
Amount expended for the purchase of anthracite coal lands, Hazleton, Hamilton, Eastwick and other tracts.	704,432		462
Appraised value of securities owned by the United New Jersey Railroad & Canal Co., and transferred with the lease.	3,859,295		
Equipment of road and canal owned by the United New Jersey Railroad & Canal Co., and transferred with the lease.	1,720,696		260,128
Amount of fuel and material on hand for repairs to locomotives, cars, and for maintenance of war, viz:			
For the Pennsylvania Railroad.	\$1,653,182		547,674
For the United New Jersey Railroad & Canal.	823,429		234,437
For the Philadelphia & Erie Railroad.	258,898		5,888
	2,735,509		
Amount of bills and accounts receivable, and amounts due from other roads, including advances made to railroad corporations for construction, and purchase of equipment used on their lines, viz:			
United New Jersey construction.	\$1,032,153		120,015
United New Jersey sinking fund and redemption account.	2,458,830		262,920
United New Jersey real estate.	1,065,871		396,464
Philadelphia & Trenton construction.	763,959		32,680
Philadelphia & Trenton real estate.	171,202		27,269
Other companies.	6,916,707		1,253,365
	12,408,812		
Cash, balance in hands of the Joint Stock Bank, London, and other parties, to pay coupons due in January, 1886.	1,114,867		10,485
Cash, balance in hands of freight and passenger agents, etc.	\$2,446,658		318,672
Cash, balance in hands of Treasurer.	3,800,754		110,192
	6,247,412		
Total assets.	\$207,891,571		\$5,829,789
Total increase.			\$1,514,725

Delaware Railroad with the railroads extending into the slate region of Northampton County, Pa., and which, it is hoped, will secure to your company a proper share of that traffic. The Long Beach Railroad is being constructed for the development of a portion of the New Jersey seashore which heretofore had no railway connection with your system.

"By a merger of the Reading Pottsville Railroad with the Pennsylvania Schuylkill Valley Railroad the line of the latter company now reaches Pottsville. It was opened for traffic as far north as Hamburg late in the season, and will be completed to Pottsville about the middle of the present year. From that point northwardly work is progressing as far as the summit of Broad Mountain, a distance of about 11 miles.

"At your annual meeting in 1881, authority was given to your board to issue from time to time 400,000 shares of the capital stock of the company. Of this amount about 180,000 shares were sold at par to the stockholders, to provide for the purchase of a majority of the share capital of the Philadelphia, Wilmington & Baltimore Co., and a large portion of the remainder has since been allotted to the shareholders of your company. For the purpose of providing in due season for the future financial wants of the company, your authority is requested for an issue of 300,000 additional shares, to be disposed of from time to time, as in the judgment of your board the best interests of your company may require.

"For a number of years past the attention of your management has been seriously directed to the organization and establishment of a relief fund, having in view the support of your employés when disabled by sickness or accident, and provision for their families in case of death. The details of the organization were referred to a committee of officers of the company, who, after diligent inquiry into the systems that had heretofore been adopted by other companies, both in this country and abroad, finally reported a comprehensive plan for the action of the board. After very careful examination this was approved and put into effect on Feb. 15 of this year. The fund is established upon so fair and liberal a basis that it is believed it will command itself to your employés and receive their cordial support, while at the same time any system that seeks to care for and promote their comfort cannot but result in direct advantage to your interests.

"Notwithstanding the largely increased traffic, the unfor-

tunate condition of the general transportation interests of the country, commented upon in the last report, is strongly reflected in the marked decrease in gross earnings of your lines, both east and west of Pittsburgh. The net results, not only to your company but to other leading railways, show that a very large proportion of their traffic was carried at unremunerative rates. Such a course cannot long be continued without being equally destructive to the interests of the railways and those of the general public; as it must be conceded that unless the railways receive a fair compensation for the work done they will be unable to maintain their properties in good condition or to offer the facilities necessary to accommodate the commerce of the country.

"This being the direct result of the construction of unnecessary lines, promoted and operated for purely speculative purposes, and the general prosperity of the country, which is so closely allied with that of the railways, having been thereby seriously affected, the thoughtful attention of those interested in the public welfare was drawn to this question, with the view of ascertaining whether some arrangement could not be reached between the larger transportation companies whereby a continuance of the evils thus produced could be averted. Your management, having been invited to indicate its policy in this direction, expressed its continued willingness to do what it properly could to secure the establishment of such harmonious relations between the various interests as would accomplish the desired result. But the question of the constitutional power of the railways of the state to take the steps necessary in their judgment for this purpose having been questioned by the Commonwealth, the matter is now before the Supreme Court, where it is hoped that principles will be established which, while not interfering with the proper development of the country, will prevent a continuance of the conditions that have so disastrously affected its prosperity during the past year.

"The investments of your company in the securities of auxiliary and affiliated lines, made for the purpose of protecting your interests and developing local traffic, amount at their par value to \$132,658,746, and are represented on the books at a cost of \$100,092,740. In addition to accomplishing the object for which these investments were made, they produced in dividends and interest during the year \$4,446,434, which sum was \$366,337 in excess of the interest upon your entire funded indebtedness, exclusive of interest on car-trust certificates."